

Part Name: Shock Absorber

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DESCRIPTION

The bicycle has evolved significantly since its invention, with numerous innovations aimed at enhancing its performance and user comfort and experience. One such prominent innovation is the shock absorber or suspension system. These components are designed to reduce the impacts of rough terrain, enhancing rider comfort, safety and control while also increasing the bicycle's overall performance. As the speed of the cycle and the roughness of the road increases so does the shock of the impacts, the tires on their own are sometimes not enough to absorb the shocks and prevent the vehicle from jumping up and down, which causes the rider to lose control. The job of the shock absorbers is to prevent this by dampening all the road shocks/irregularities.

DIMENSIONS

1. Length =265 mm
2. The diameter of the holes at the ends=20 mm
3. Width of the ends=35 mm
4. Radius of the coil= 30 mm

PROCESS OF CONSTRUCTION

1. Coil Design:

- Initiated the design process by creating the coil in the XY plane using the specialized coil feature.
- Defined specific parameters including revolution, height, pitch, transition angle, and flat angle to precisely shape the coil.
- Utilized the project cut edges and extrusion features to flatten the coil ends, ensuring seamless connection with other components.

2. Shock Body Design:

- Commenced the design of the shock body with the creation of a 2D sketch, subsequently extruding it to form a cylindrical structure.
- Applied the threads feature to introduce realistic threads on the shock body, enhancing its authenticity.
- Modelled the ball end by following a similar process of 2D sketching and extrusion, refining the edges with fillet features for a lifelike appearance.
- Incorporated a strategically placed hole at one end to facilitate the passage of the shock shaft.

3. Shock Shaft Design:

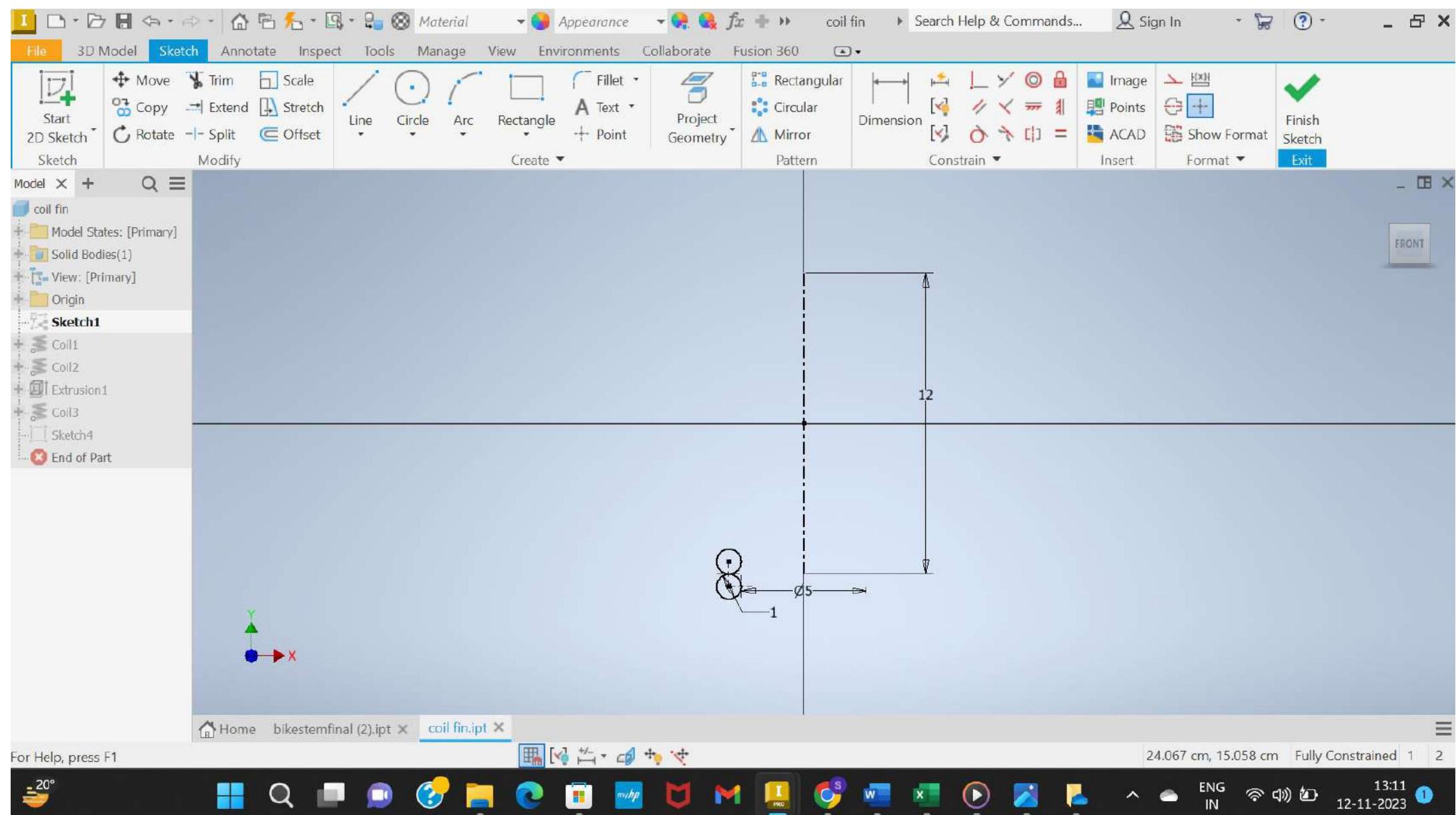
- Developed the shock shaft, including the rod, with outer dimensions matching those of the coil for cohesive integration.
- Crafted the ends of the shock absorber with precision to ensure compatibility with the coil.

4. Assembly:

- Executed a meticulous step-by-step assembly of the five components, employing constraints to align their axes accurately.
- Implemented plane constraints to secure the proper connection points, ensuring a coherent and functional shock absorber model.

5. Finalization:

- Culminated the design process with a comprehensive assembly, validating the coherence and alignment of each part.
- Achieved a fully functional shock absorber model, where every element is seamlessly interconnected to deliver a cohesive and realistic representation.



SolidWorks interface showing the creation of a coil feature.

Model Tree:

- coil fin
- + Model States: [Primary]
- + Solid Bodies(1)
- + View: [Primary]
- + Origin
- + Sketch1
- + Coil1
- + Coil2
- + Extrusion1
- + Coil3
- + Sketch4
- End of Part

Properties Panel (Coil1):

Input Geometry:

- Profiles: 1 Profile
- Axis: 1 Axis

Behavior:

- Method: Revolution and Height
- Revolution: 5.000 ul
- Height: 11.000 cm
- Taper: 0.00 deg
- Rotation: CW (counter-clockwise)
- Close Start
- Flat Angle: 1.00 deg
- Transition Angle: 30.00 deg
- Close End
- Flat Angle: 1.00 deg
- Transition Angle: 30.00 deg

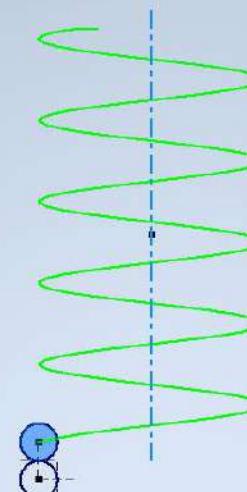
Output:

Select profiles. To deselect, press Esc.

Buttons: OK, Cancel, +

Toolbar: File, 3D Model, Sketch, Annotate, Inspect, Tools, Manage, View, Environments, Collaborate, Fusion 360, Search Help & Commands..., Sign In, Shopping Cart, Help, Close.

Bottom Taskbar: 20°, Windows Start, Search, Task View, File Explorer, Edge, mhp, Mendeley, Google Chrome, Word, Excel, Powerpoint, Cloud, ENG IN, Wi-Fi, Battery, 13:12, 12-11-2023, Notifications.



Solid Bodies(1)

View: [Primary]

Origin

Sketch1

Coil1

Coil2

Extrusion1

Coil3

Sketch4

End of Part

coil fin

Model States: [Primary]

Properties

Coil2

No Preset

Input Geometry

Profiles: 1 Profile

Axis: 1 Axis

Behavior

Method: Pitch and Revolution

Pitch: $d1 + 0.050 \text{ cm}$

Revolution: 2.000 μl

Taper: 0.00 deg

Rotation: CW (Clockwise)

Close Start

Flat Angle: 1.00 deg

Transition Angle: 30.00 deg

Close End

Flat Angle: 1.00 deg

Transition Angle: 30.00 deg

Output

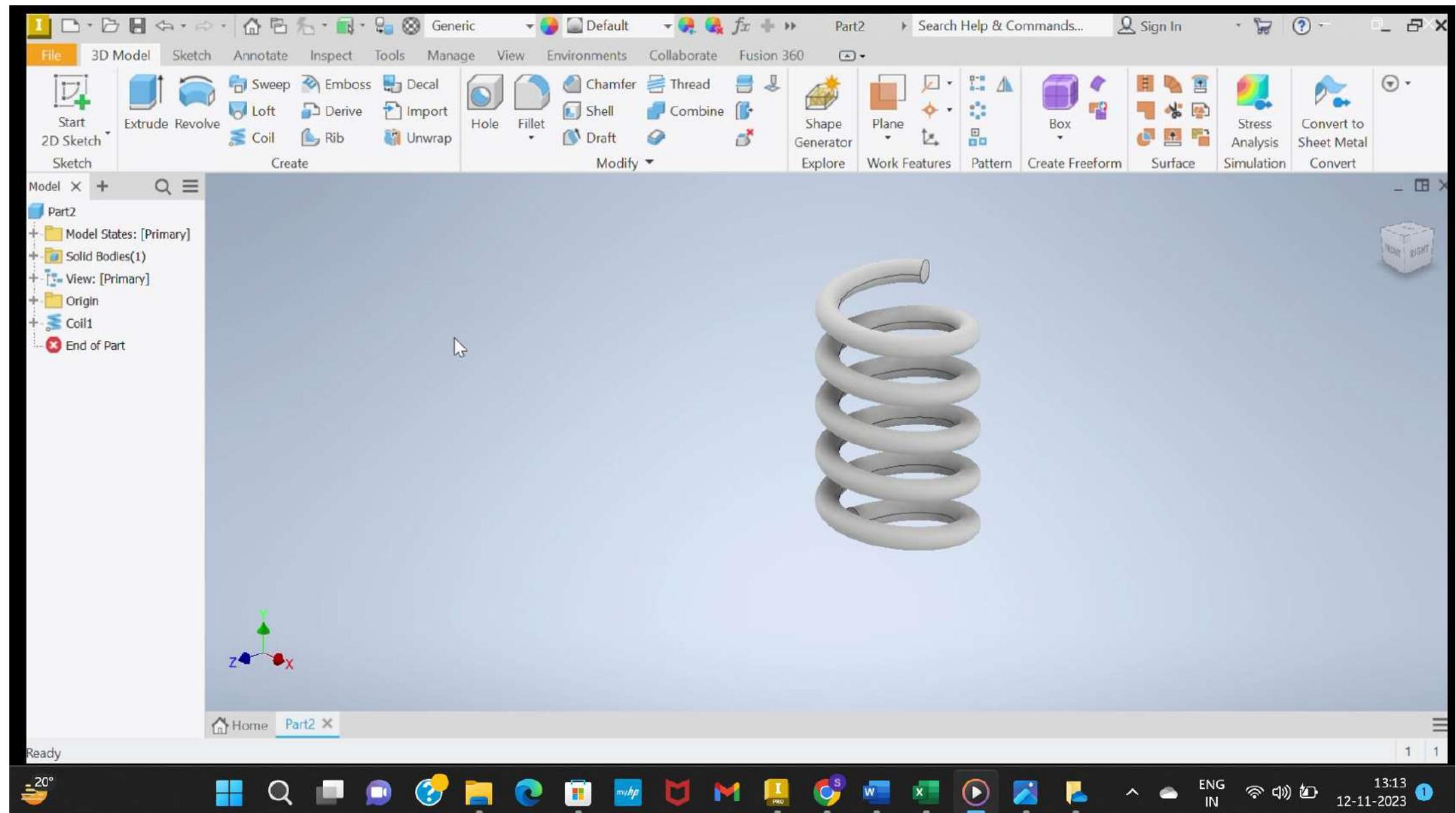
Select profiles. To deselect, press Esc.

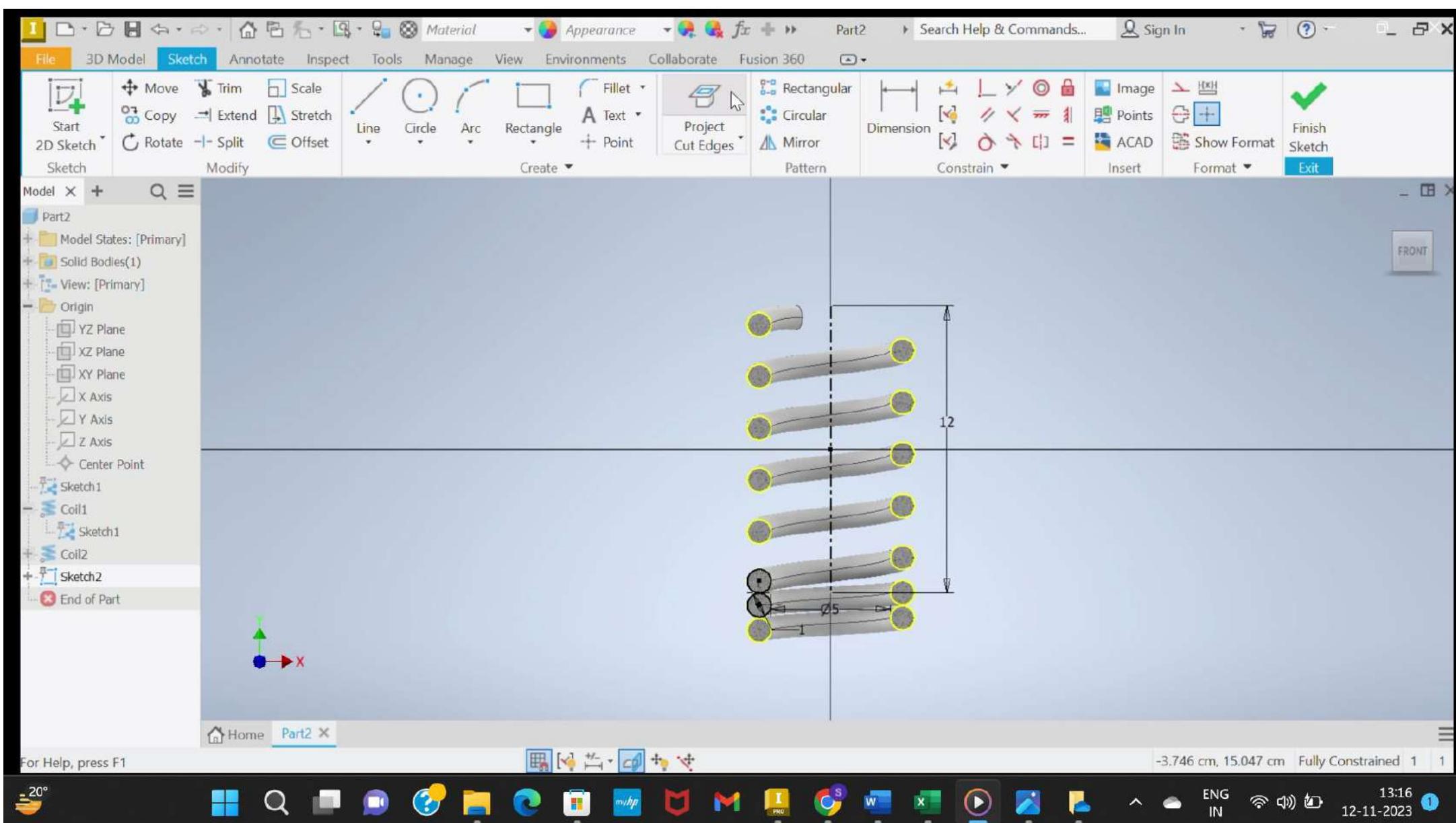
OK Cancel

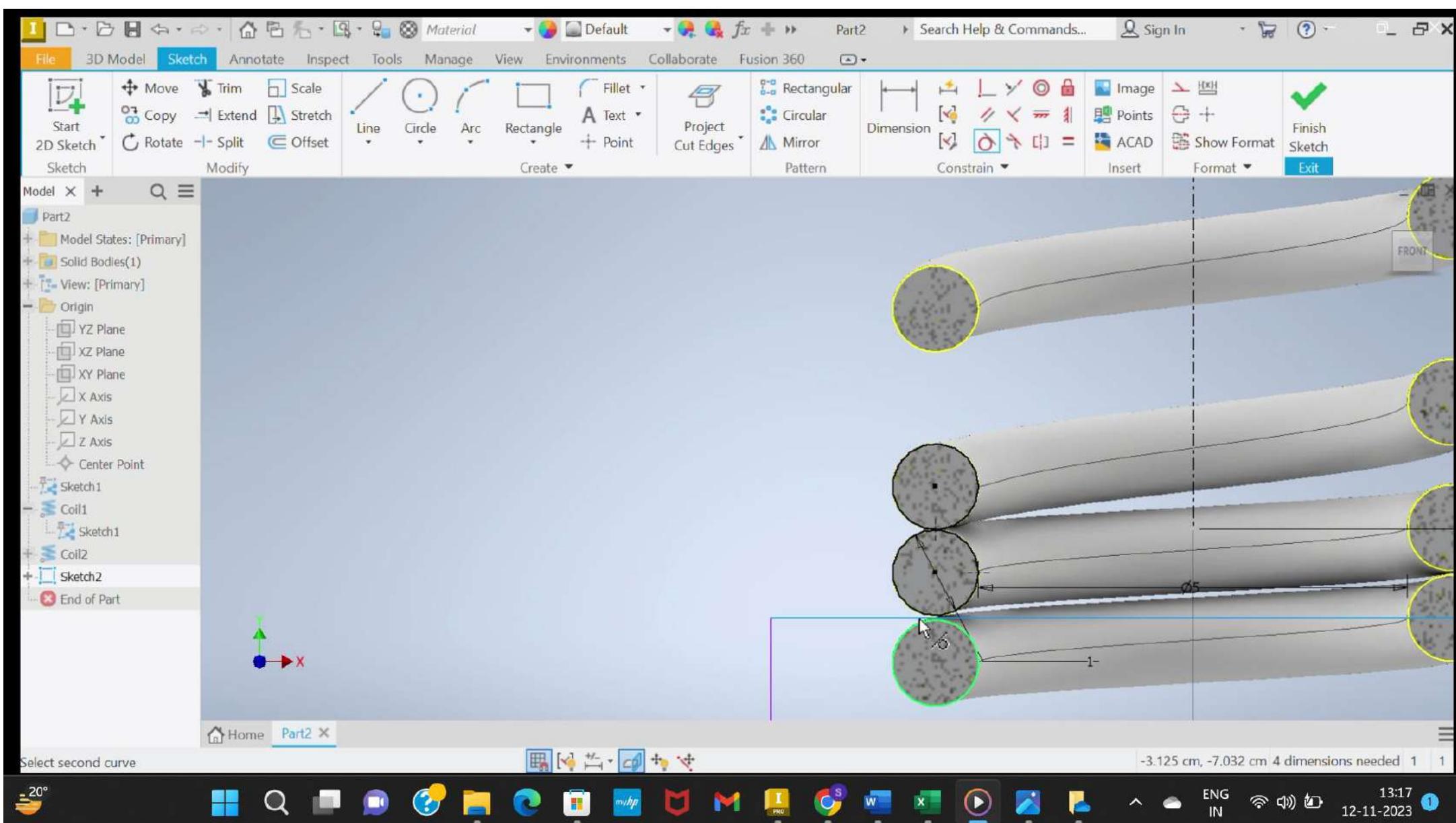
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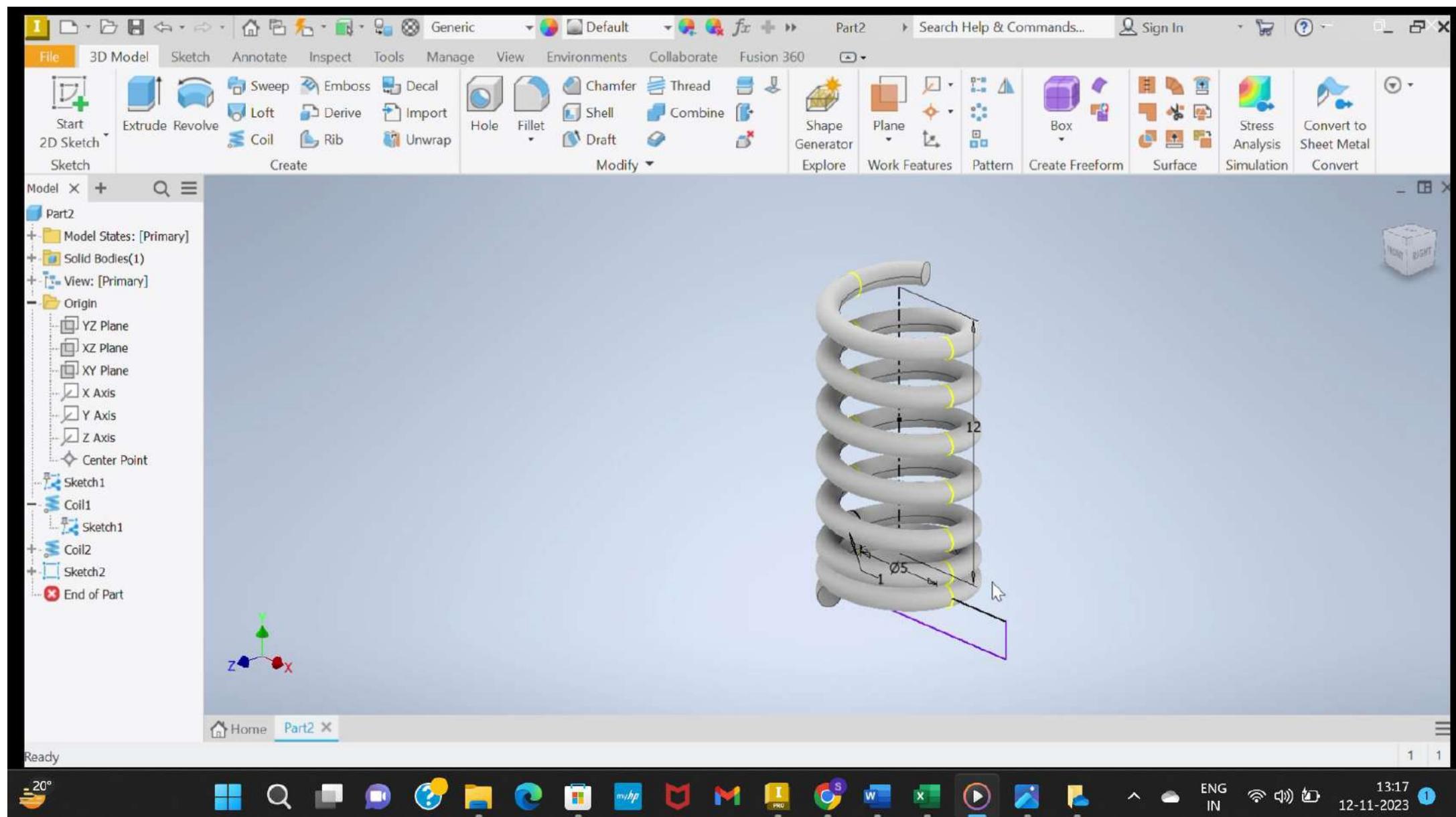
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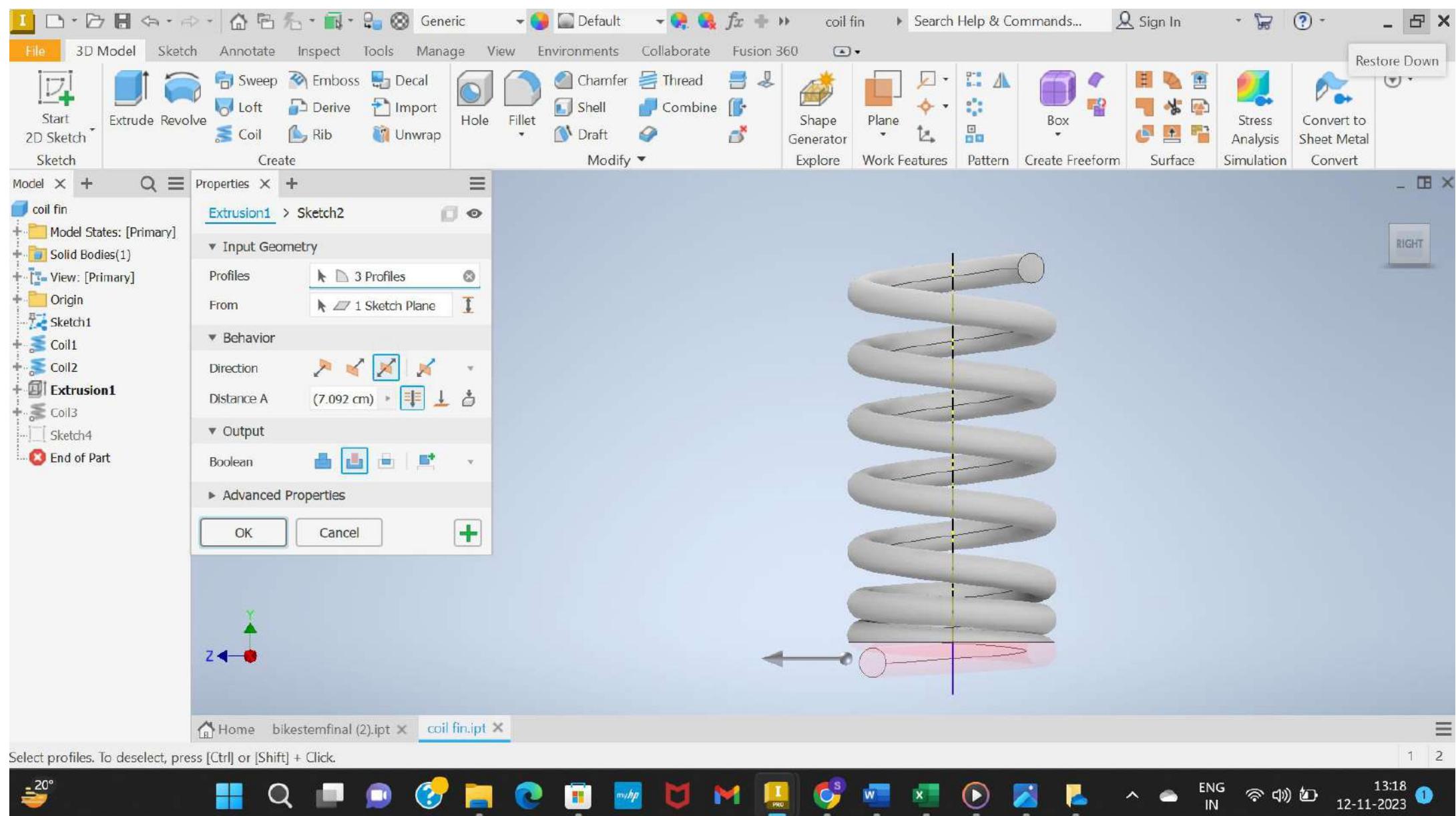
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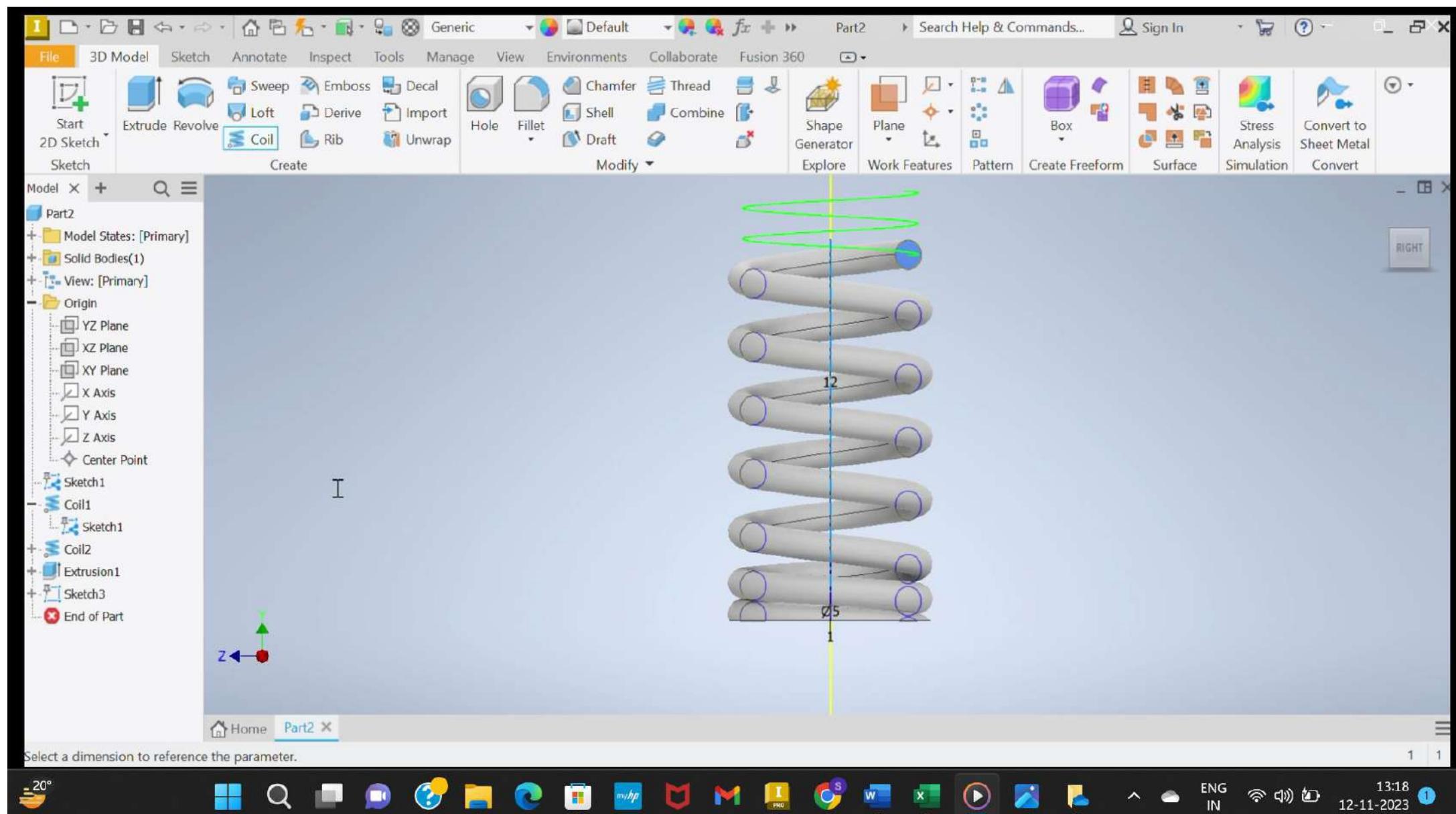












ENG

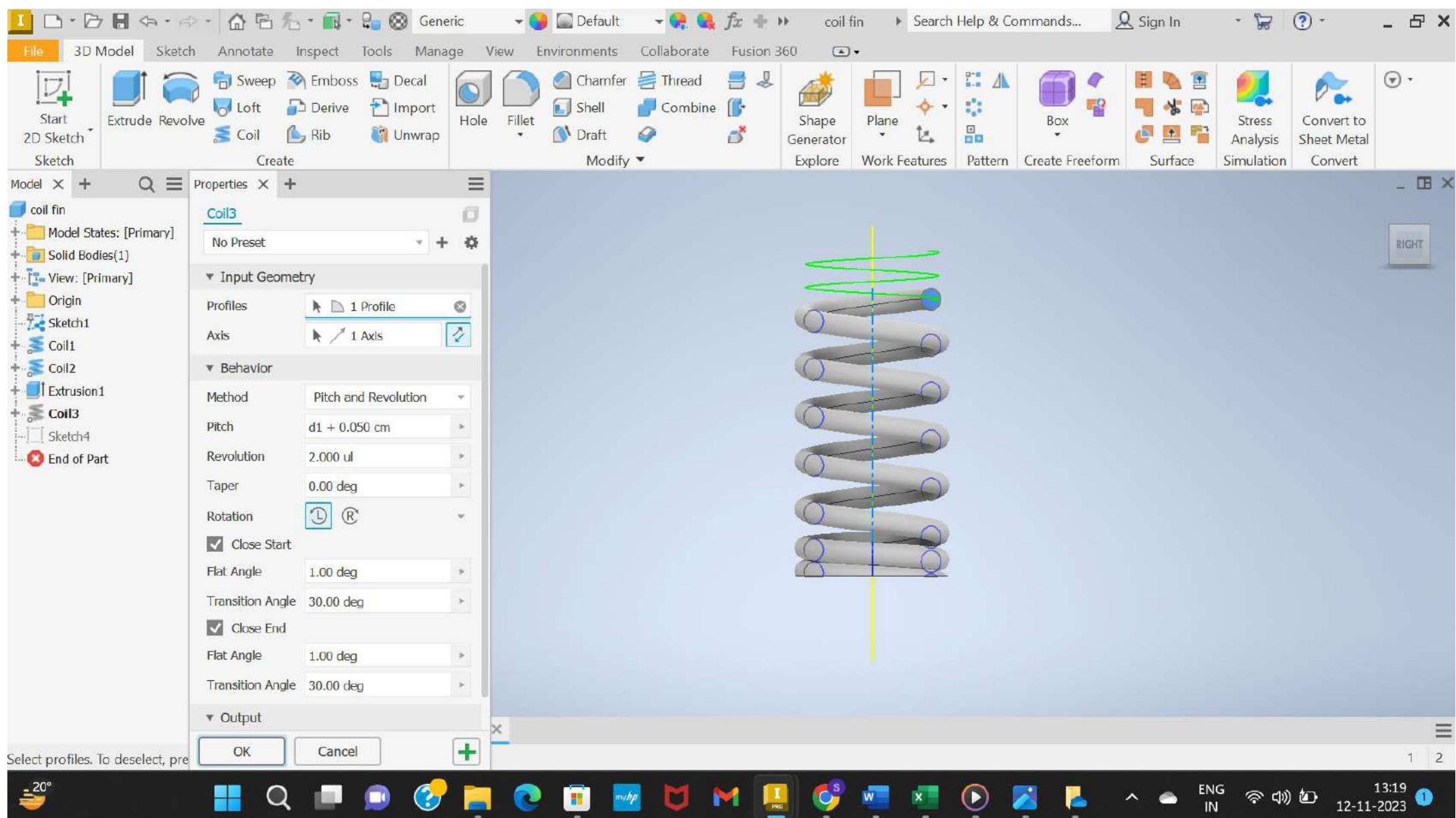
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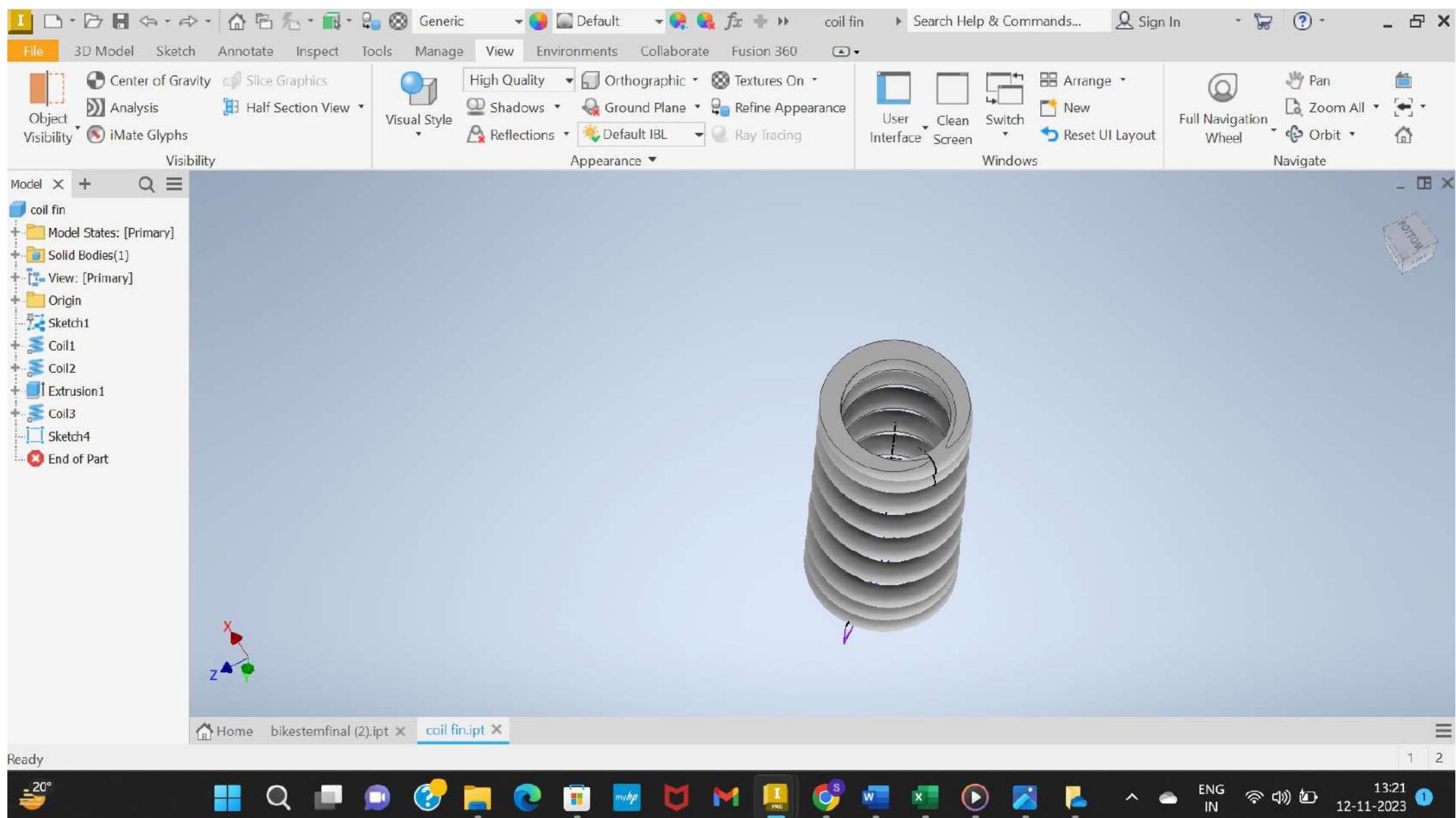


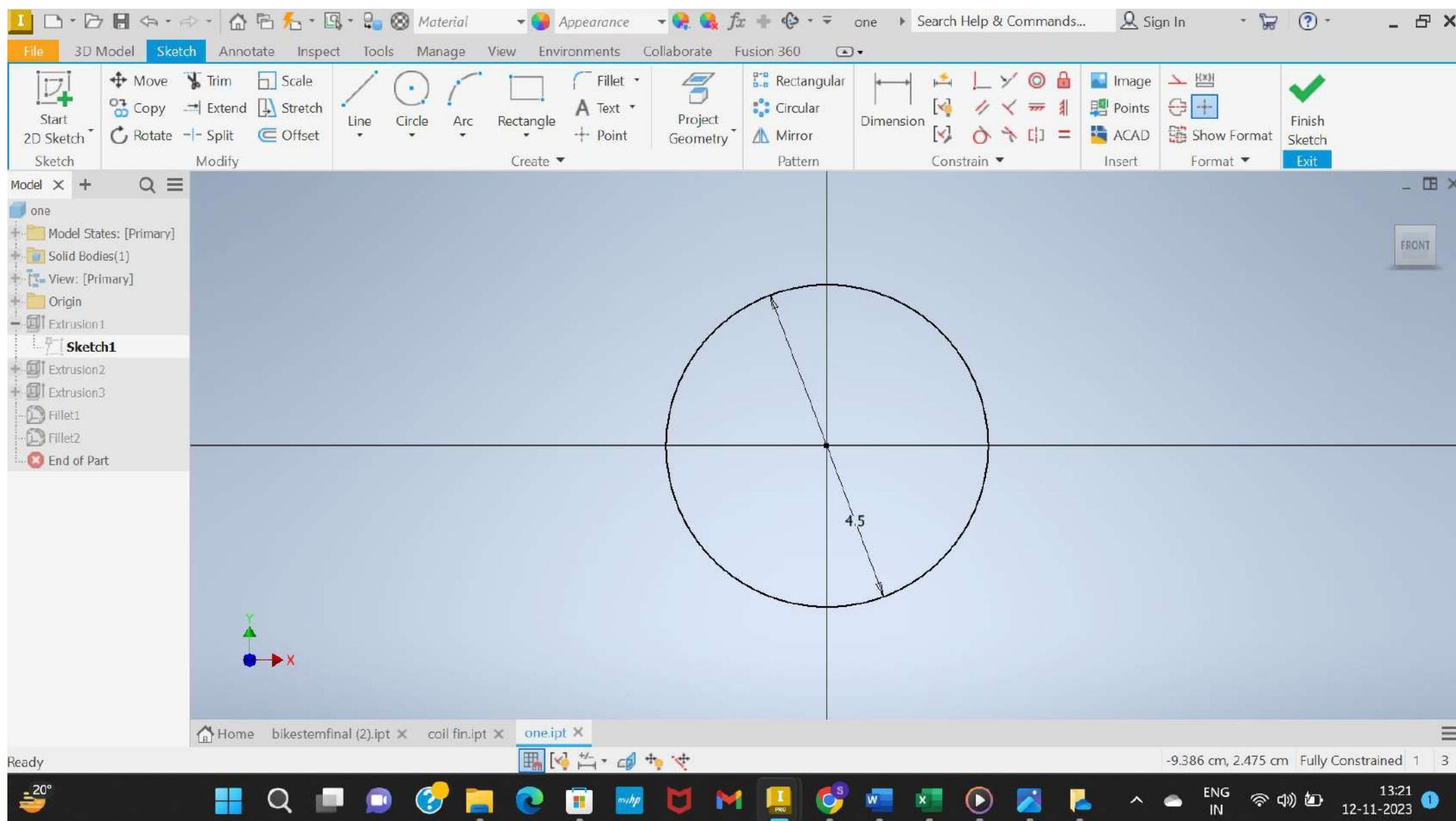
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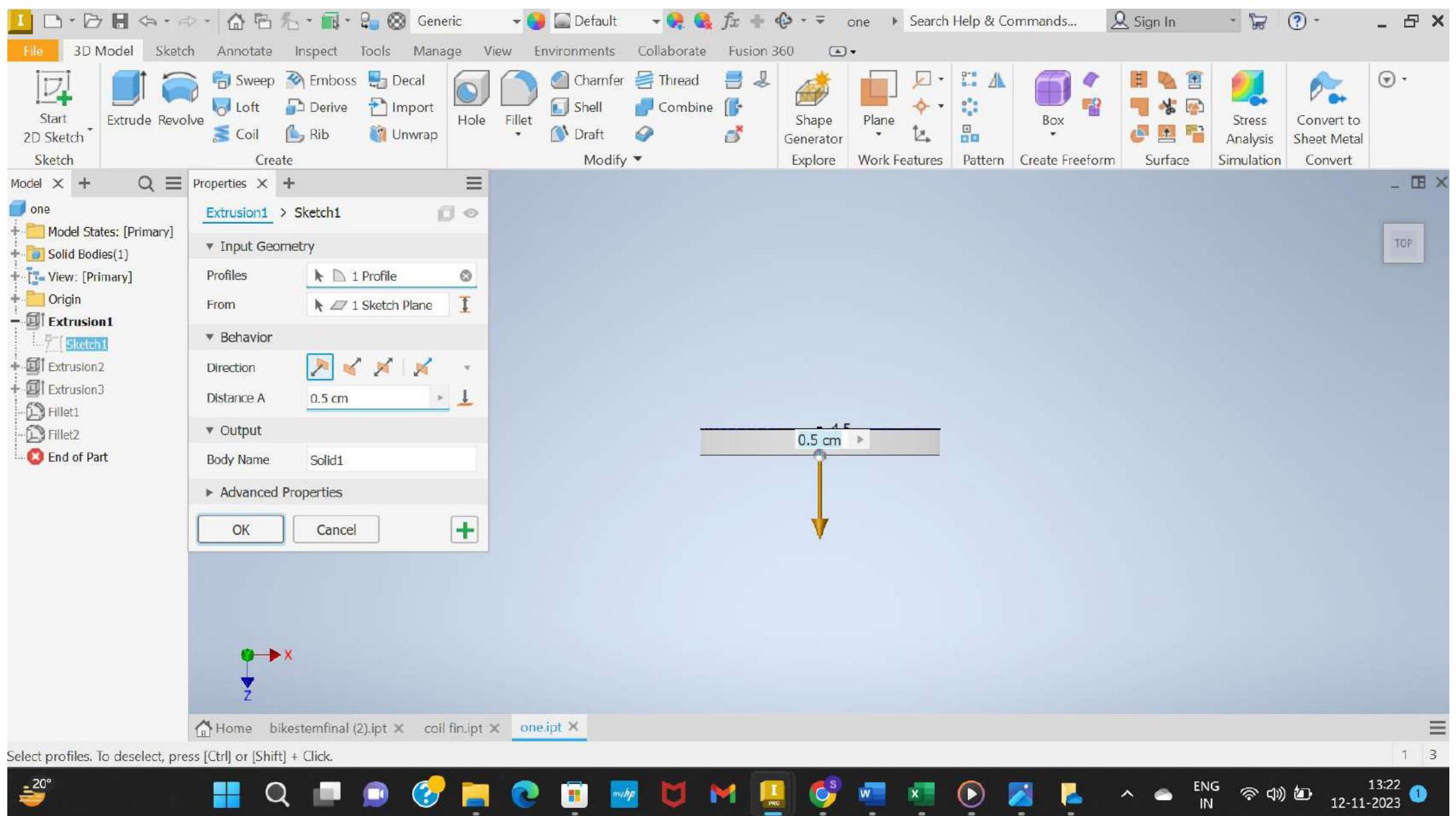
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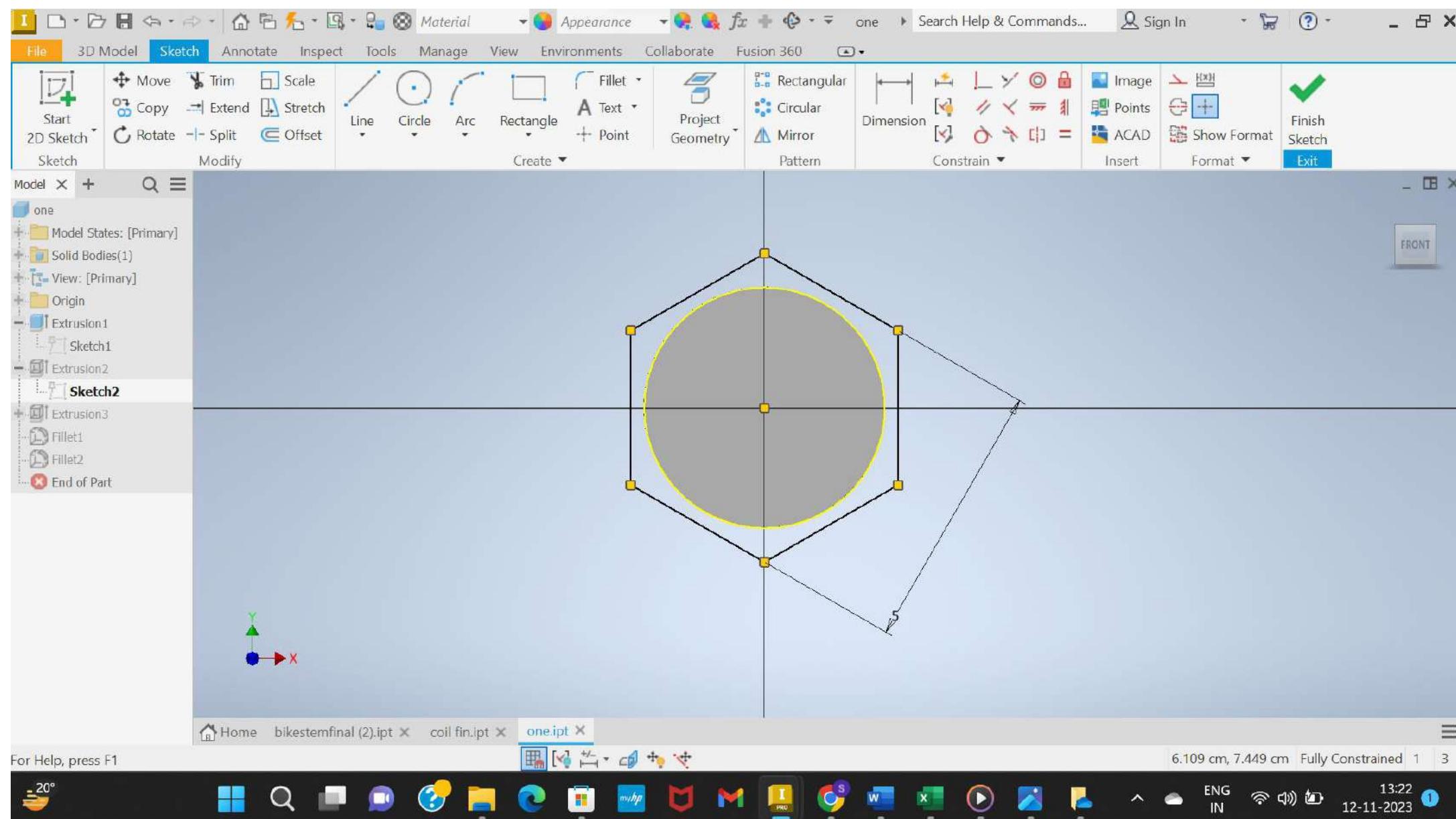
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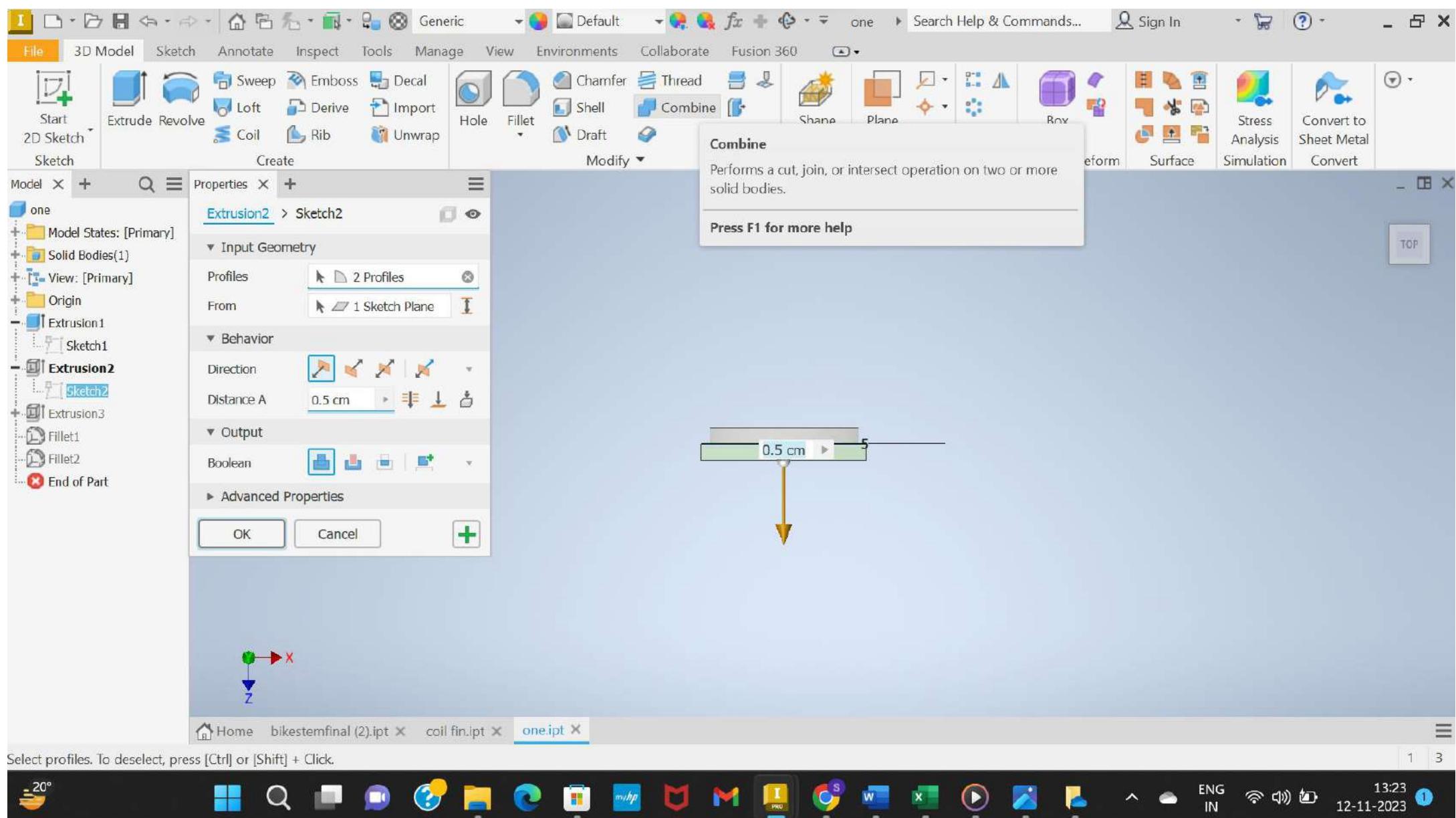


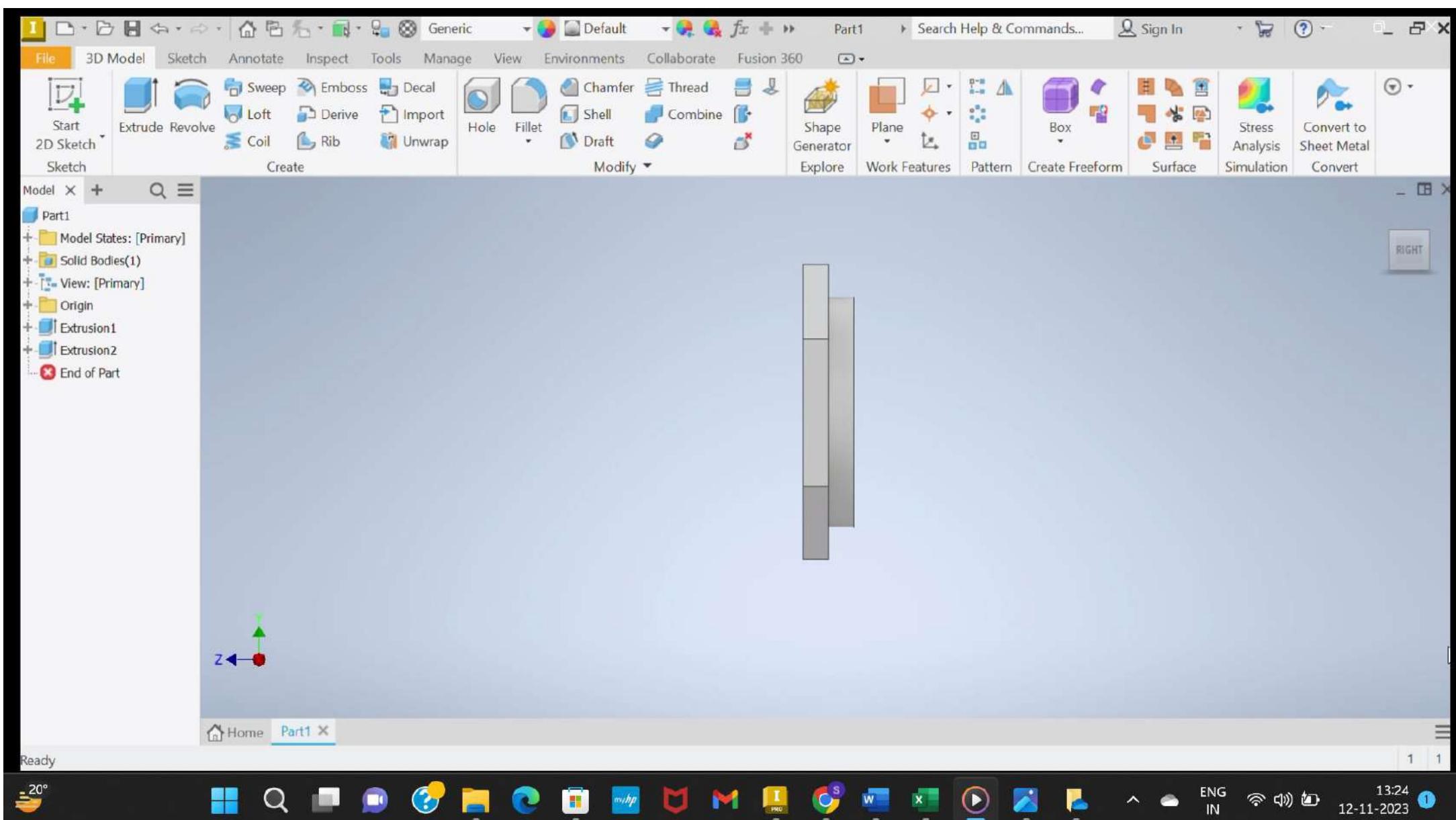


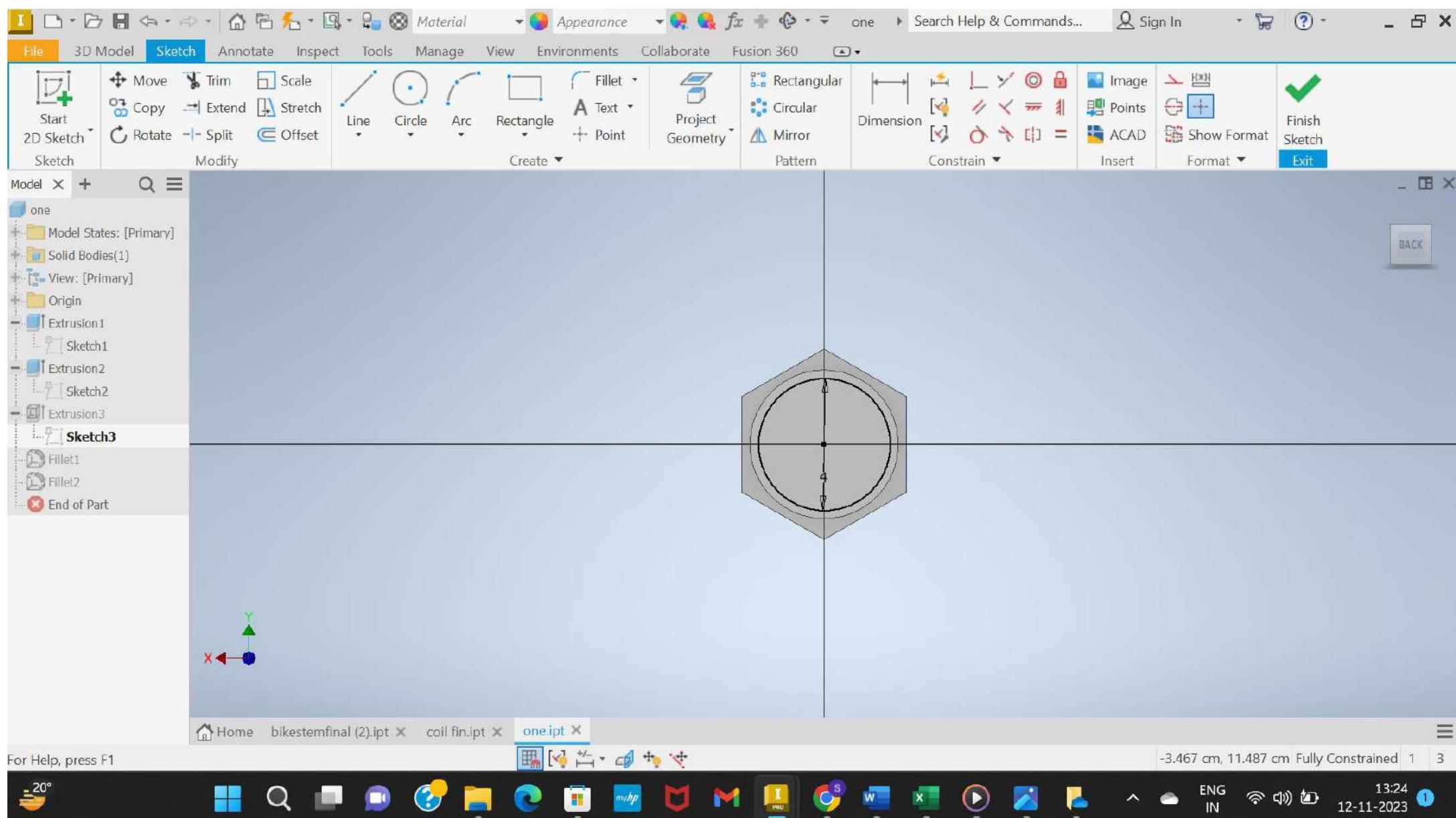


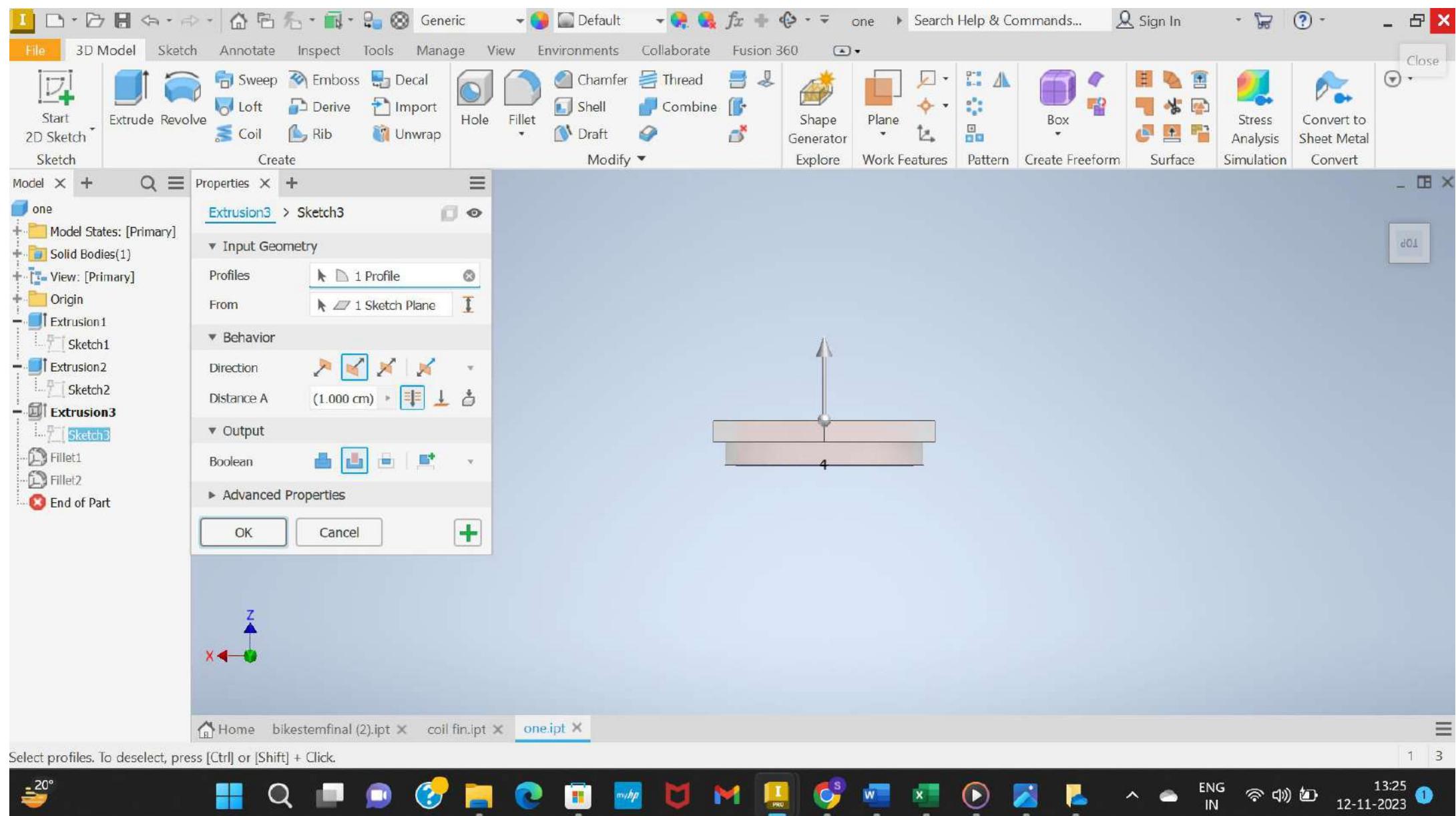


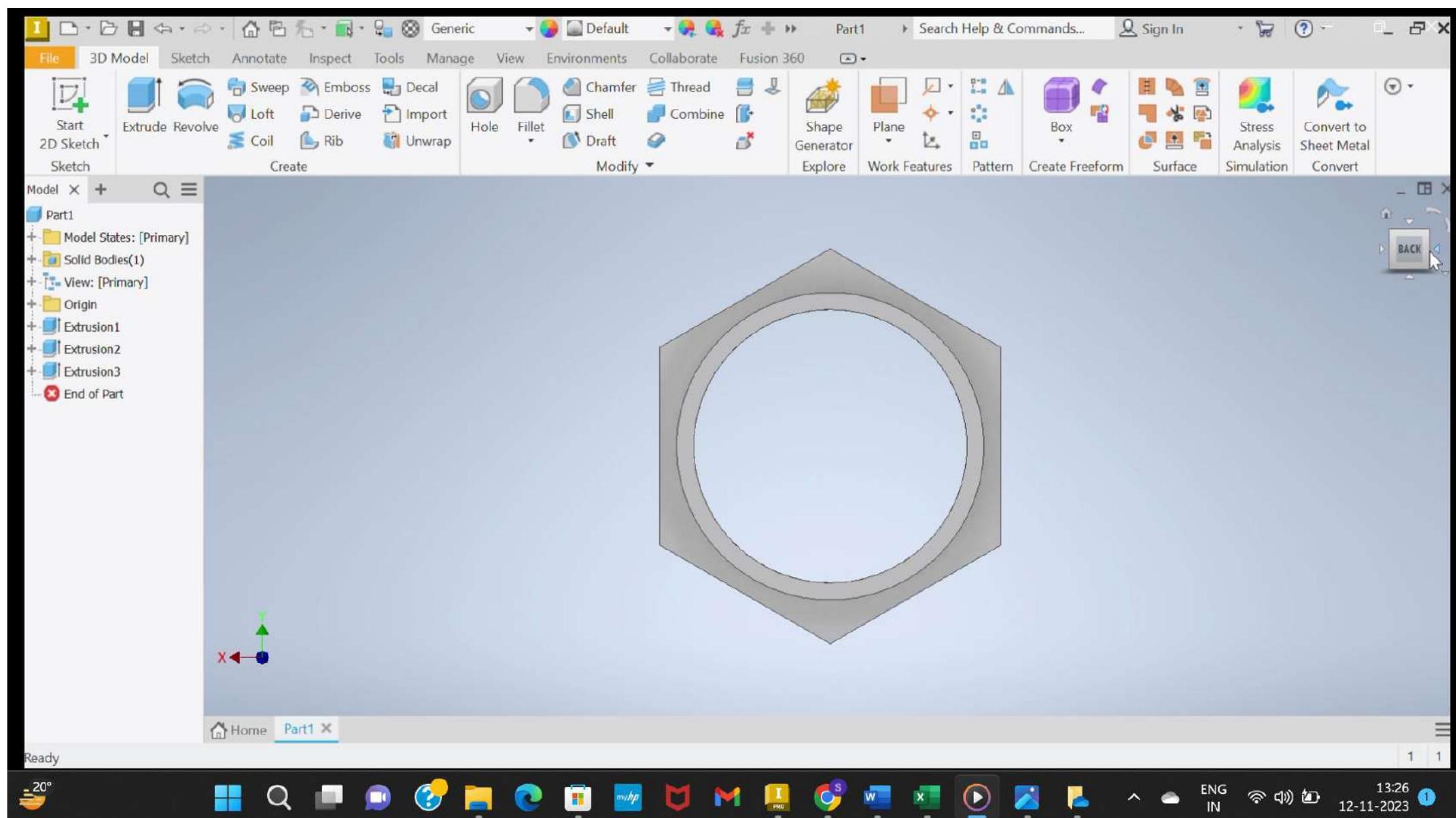


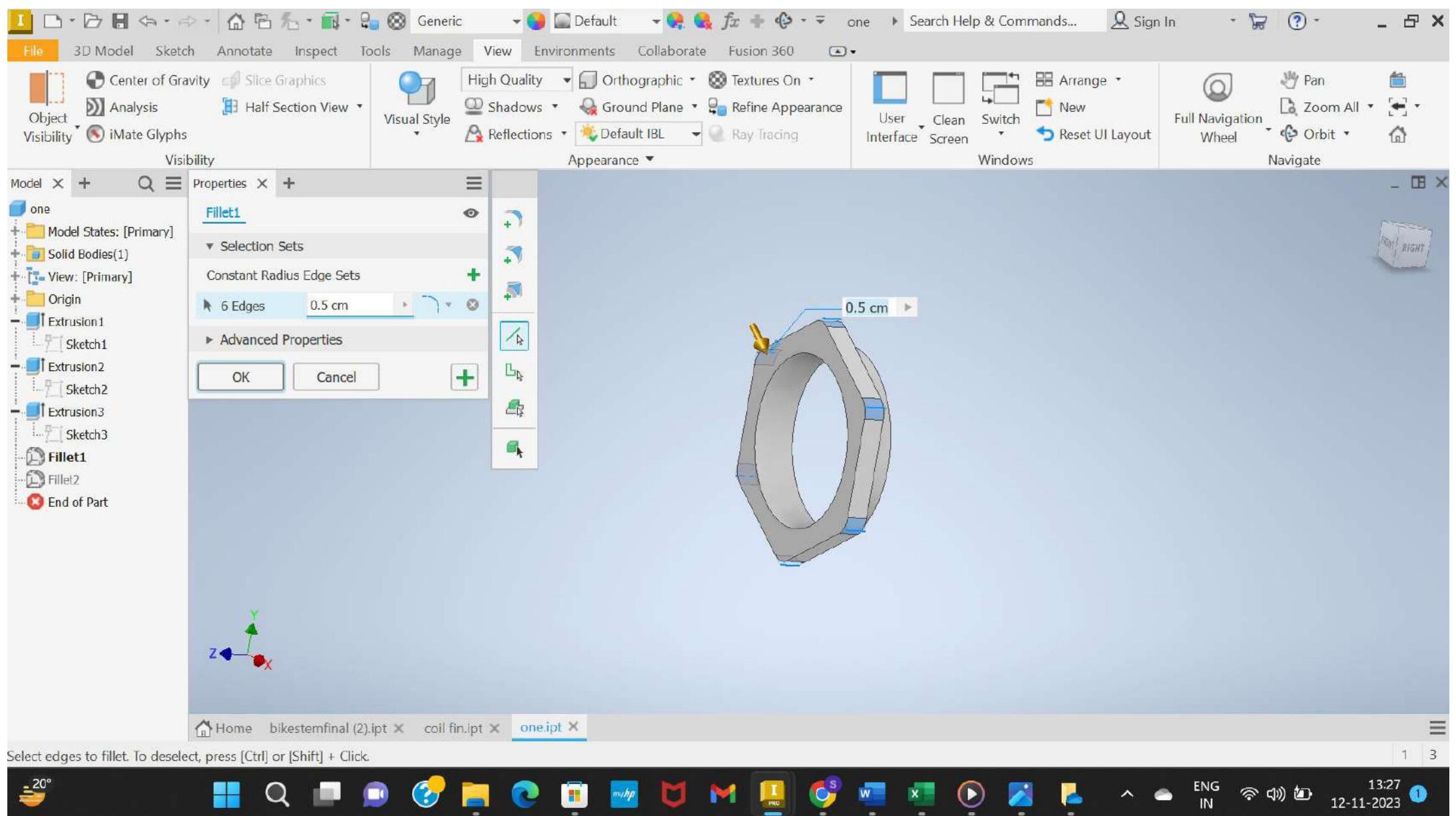


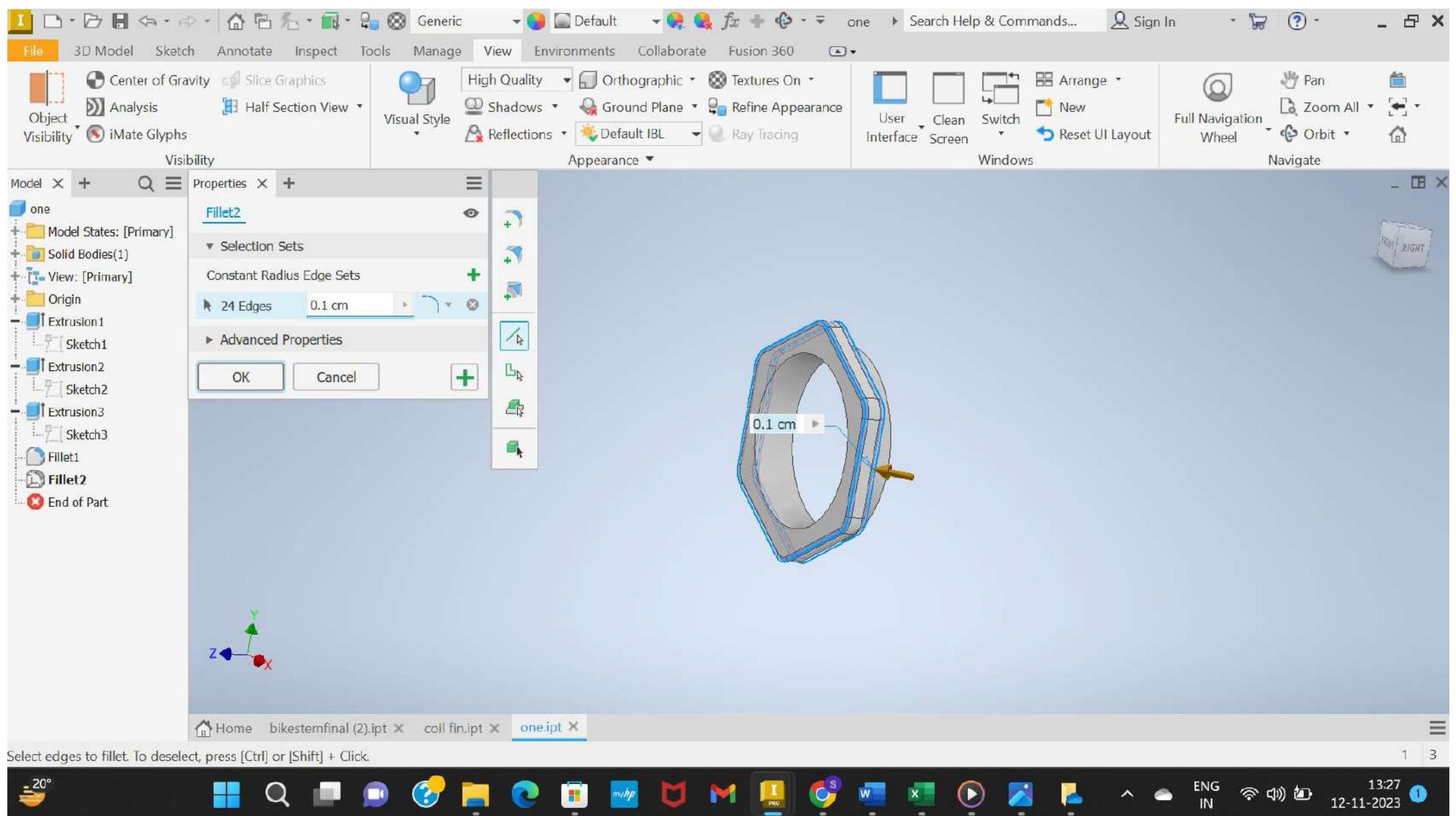


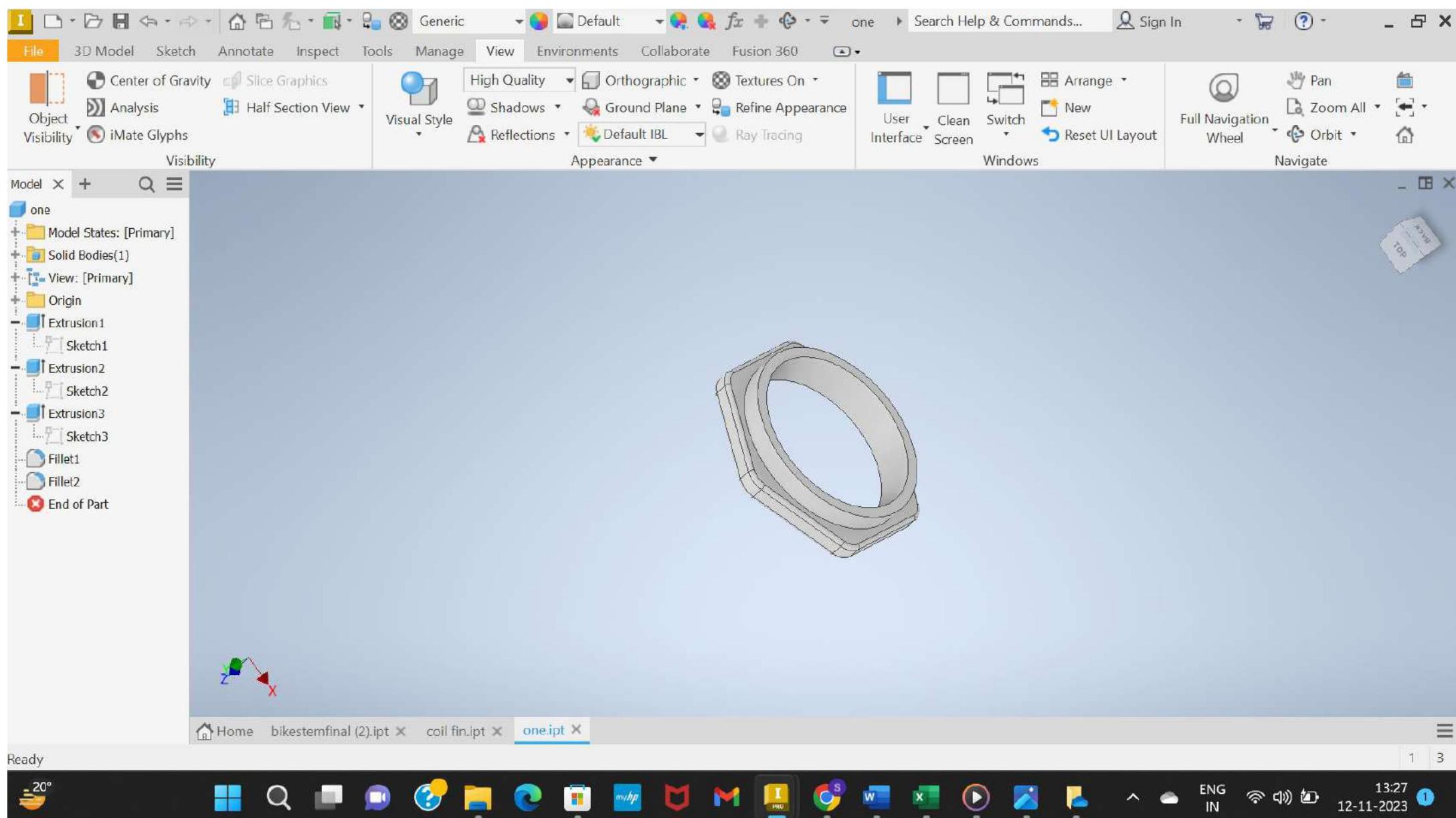


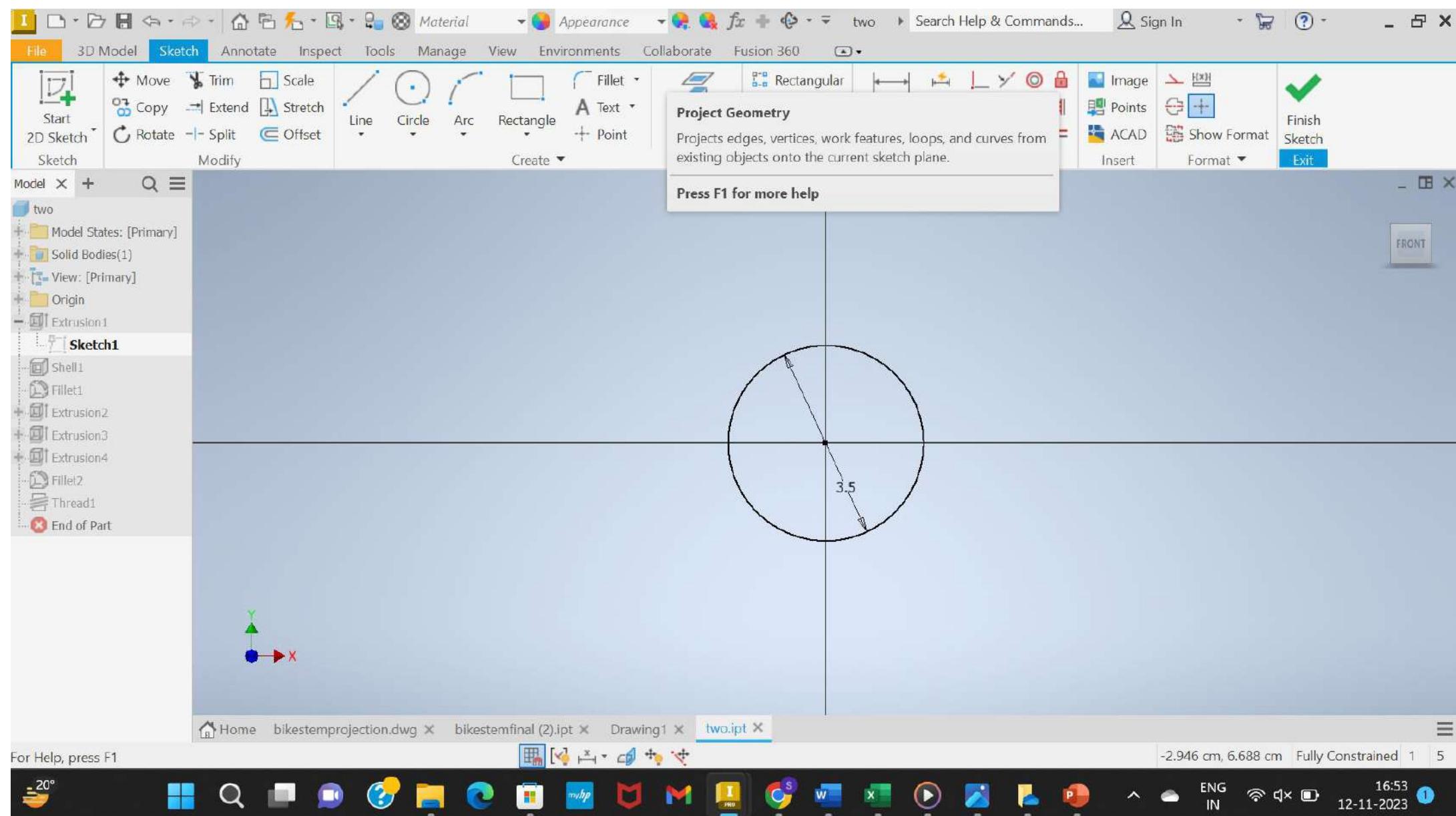


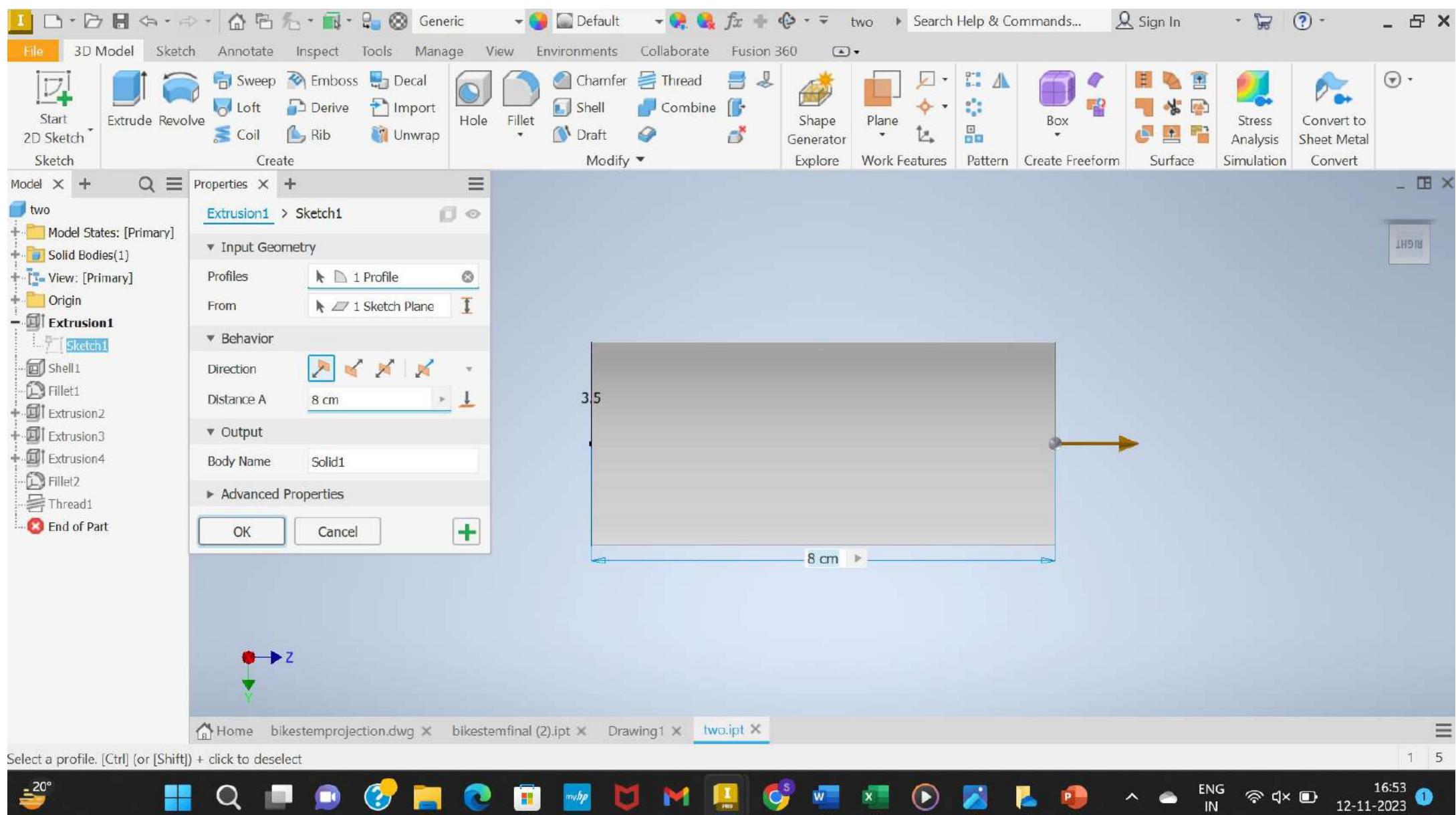


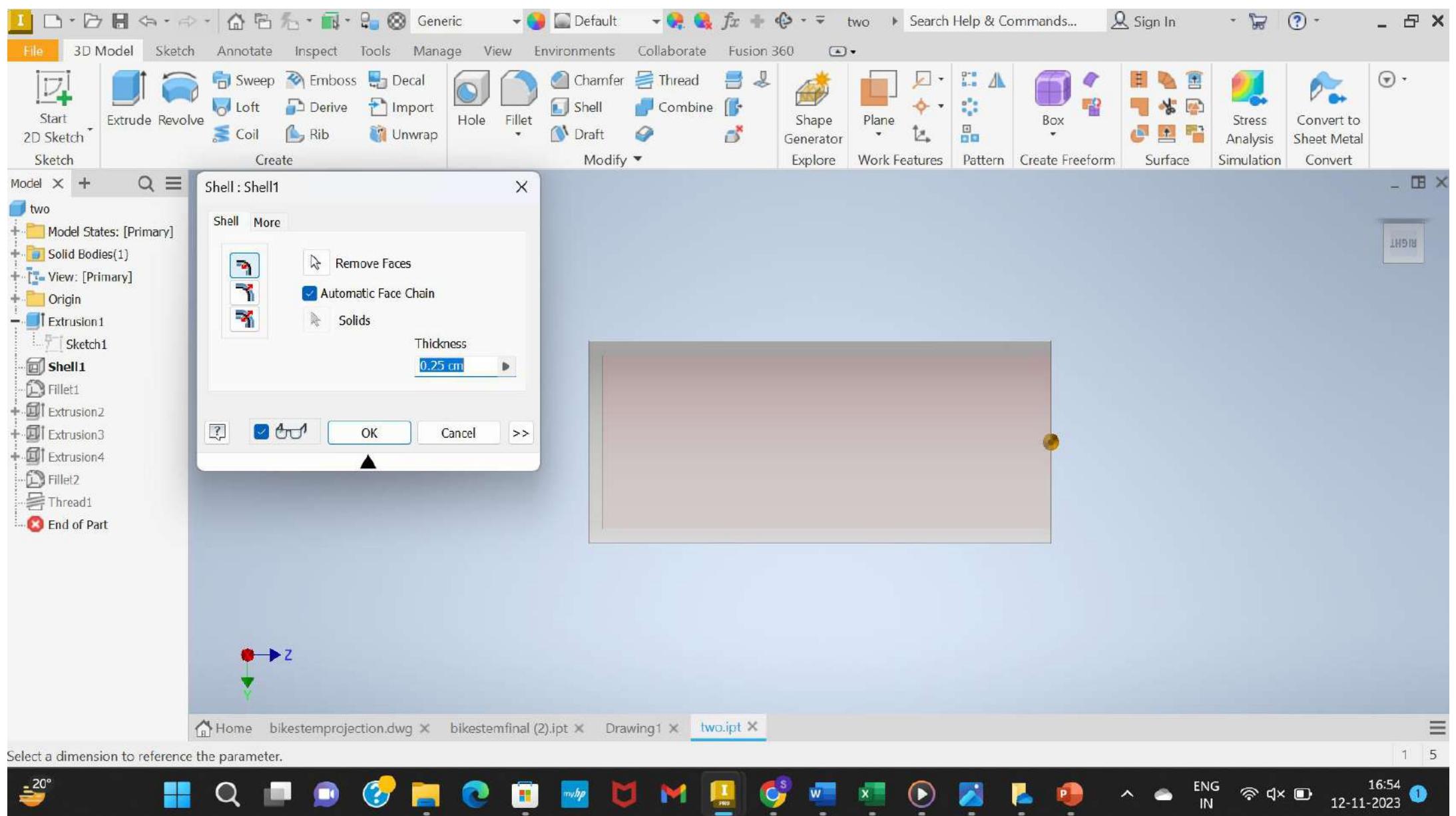


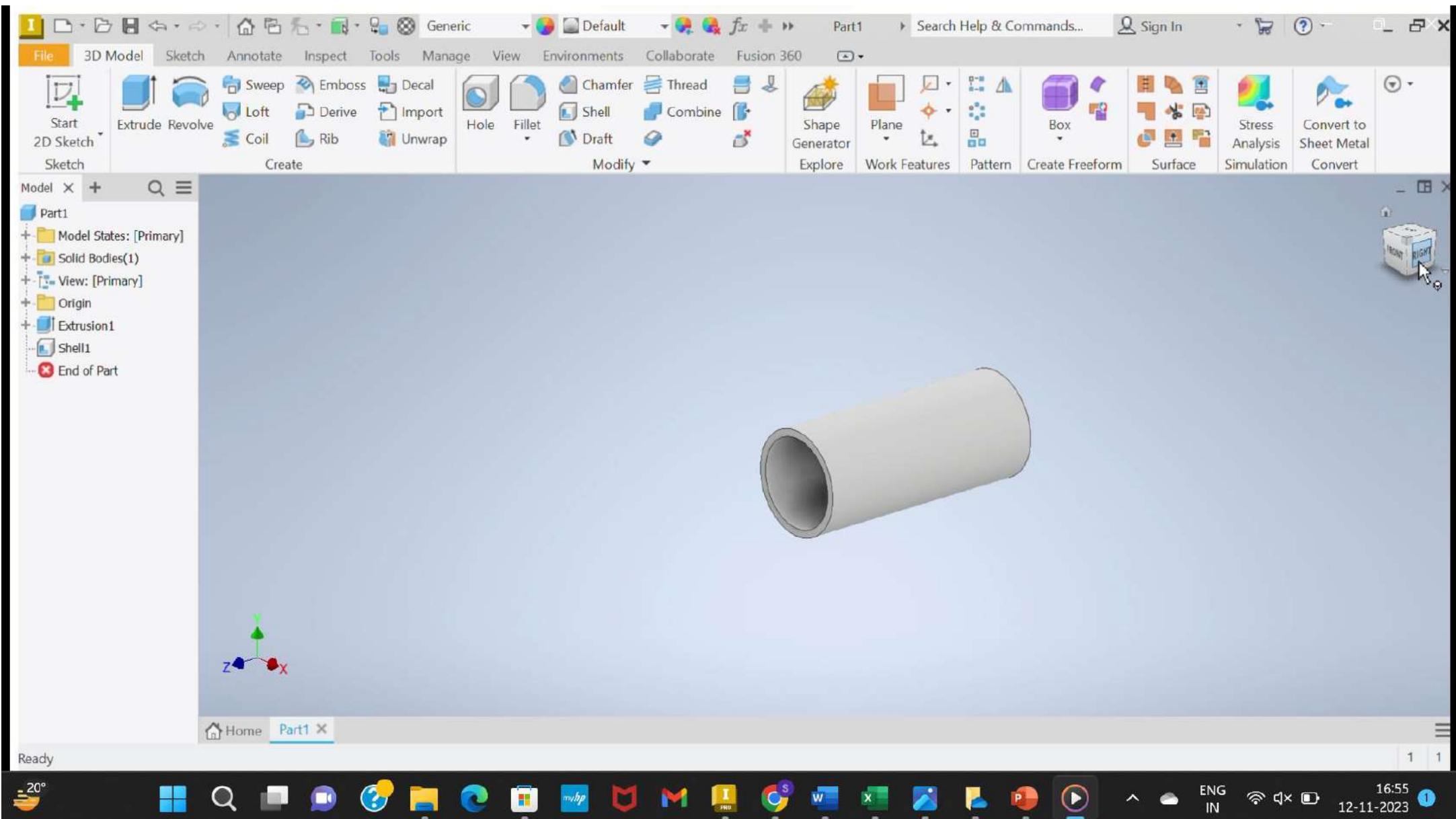


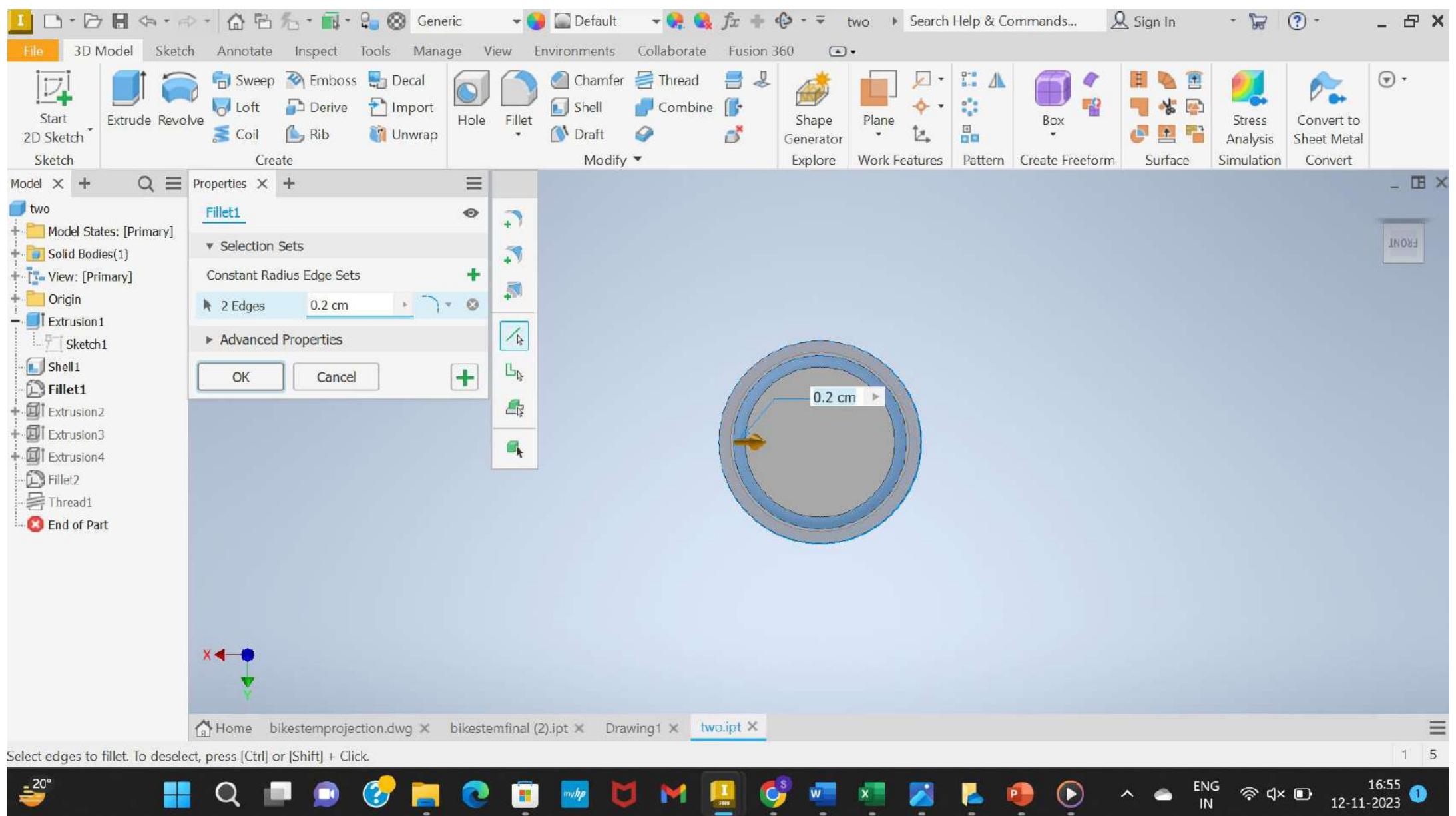


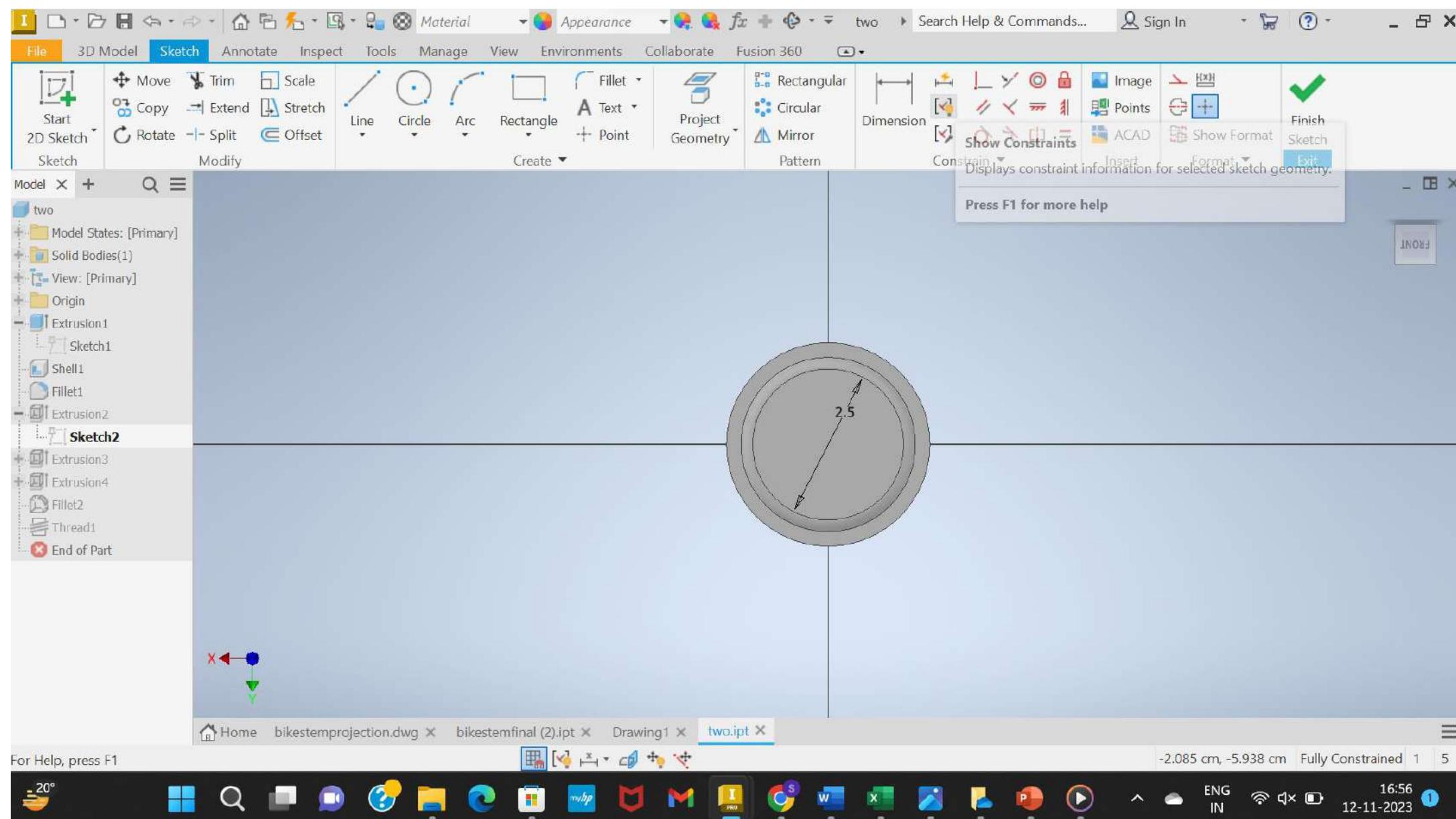


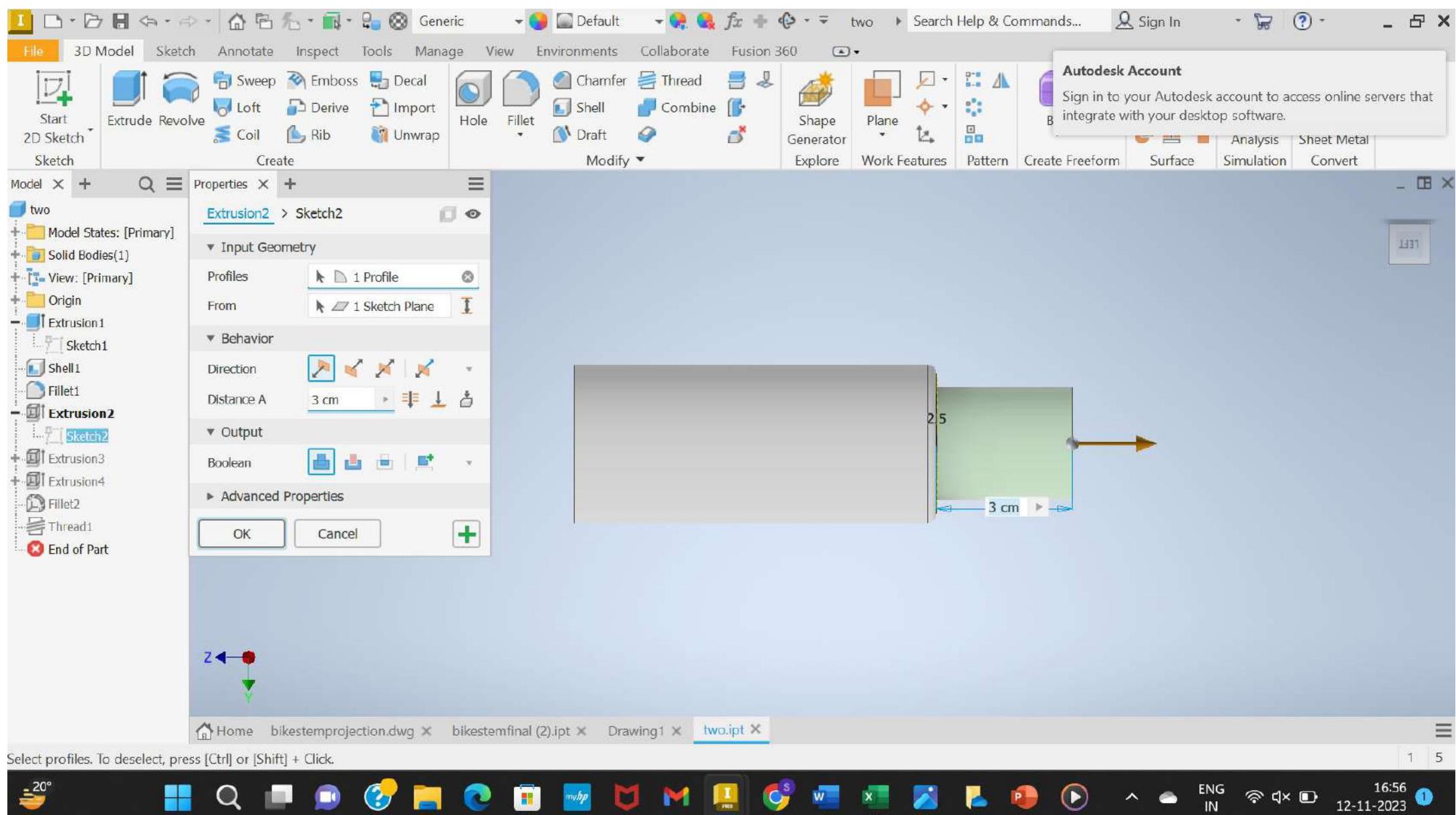


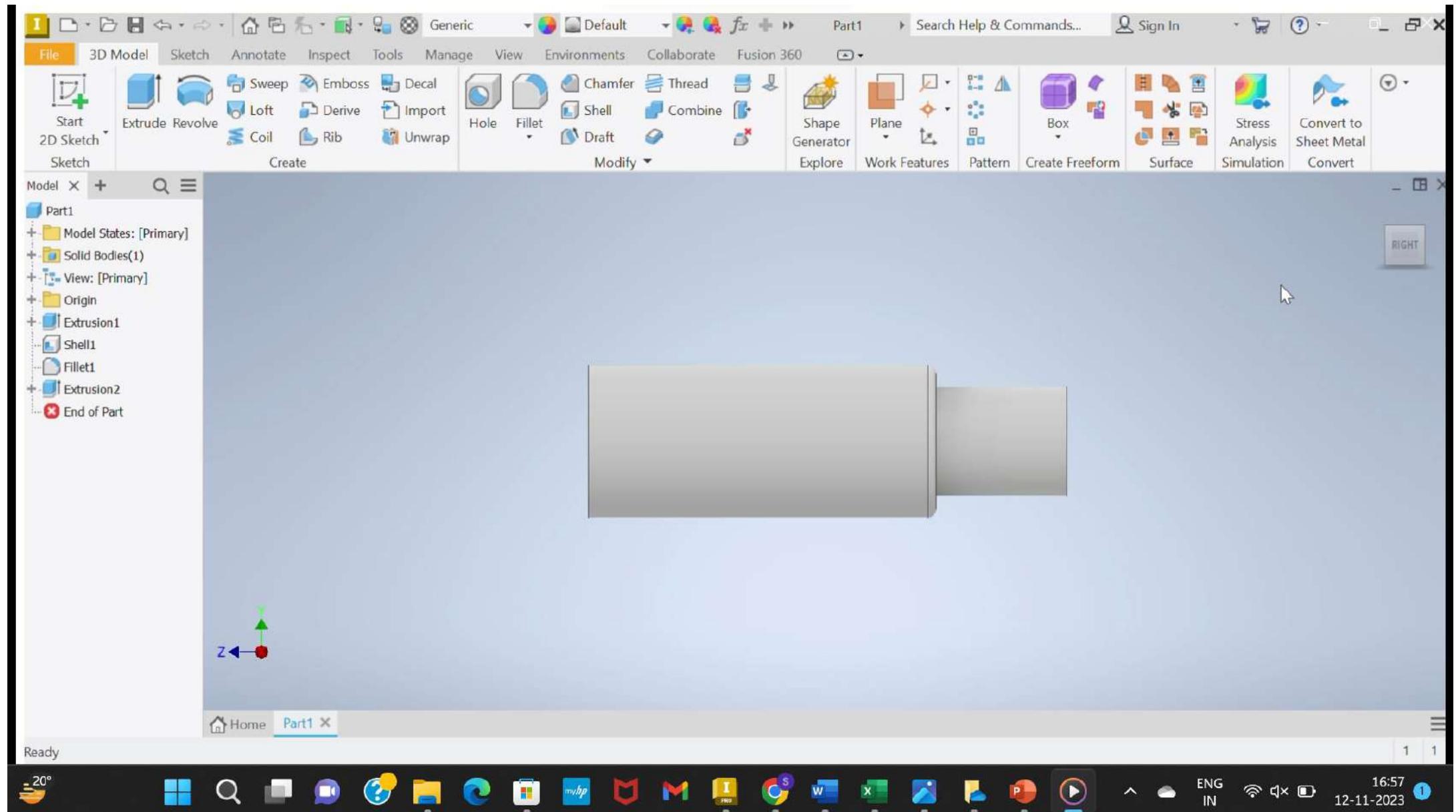


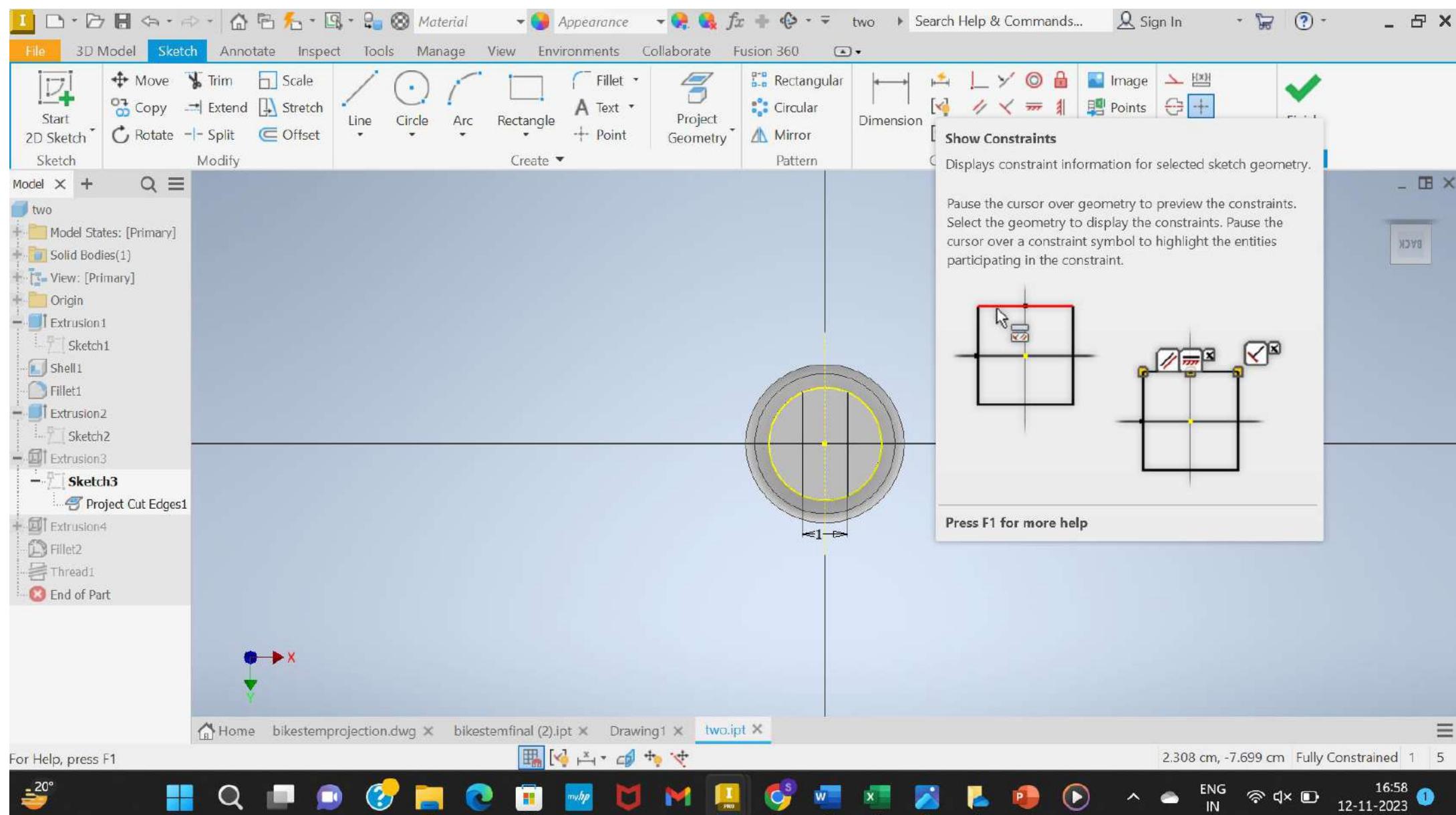


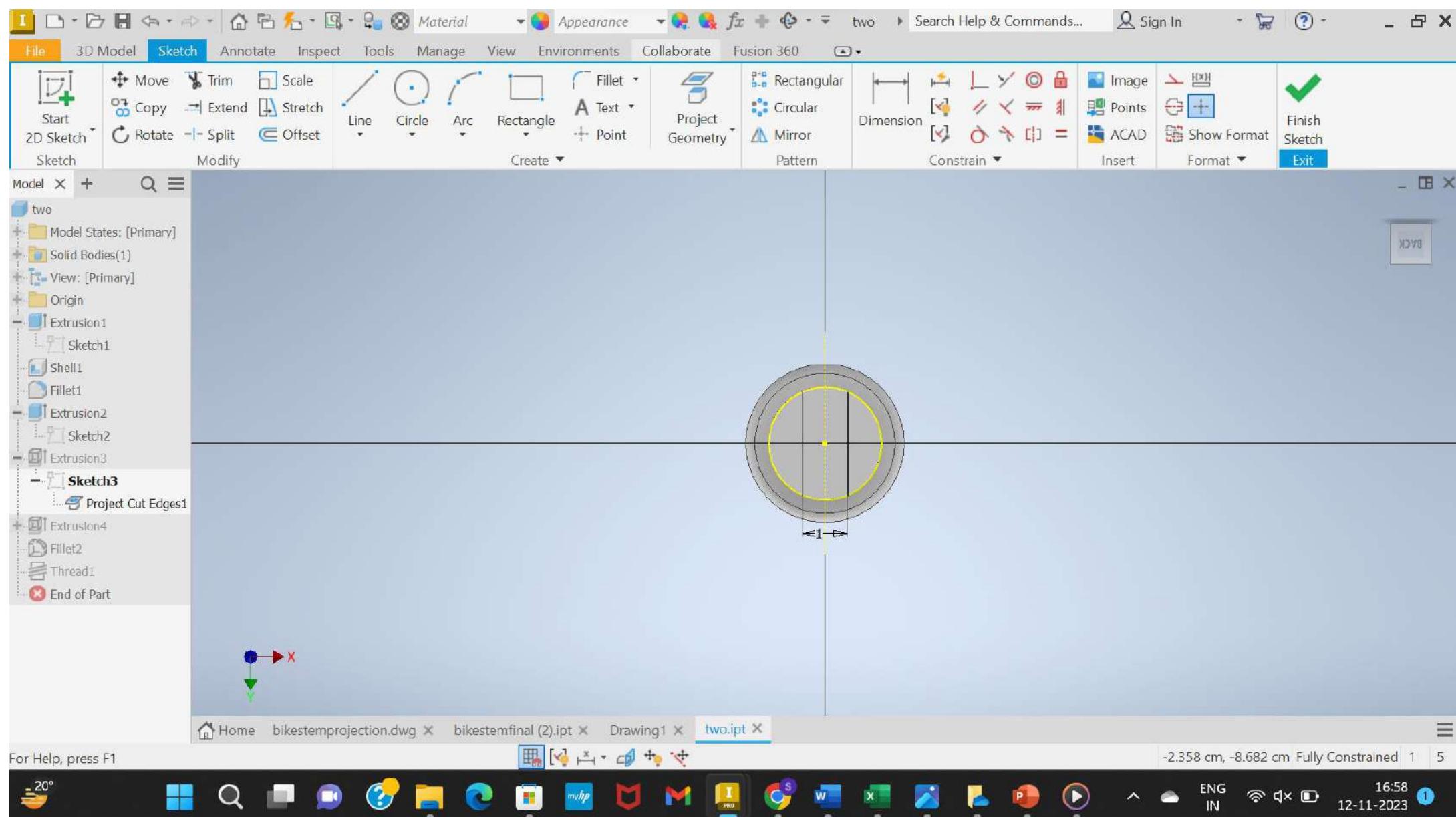








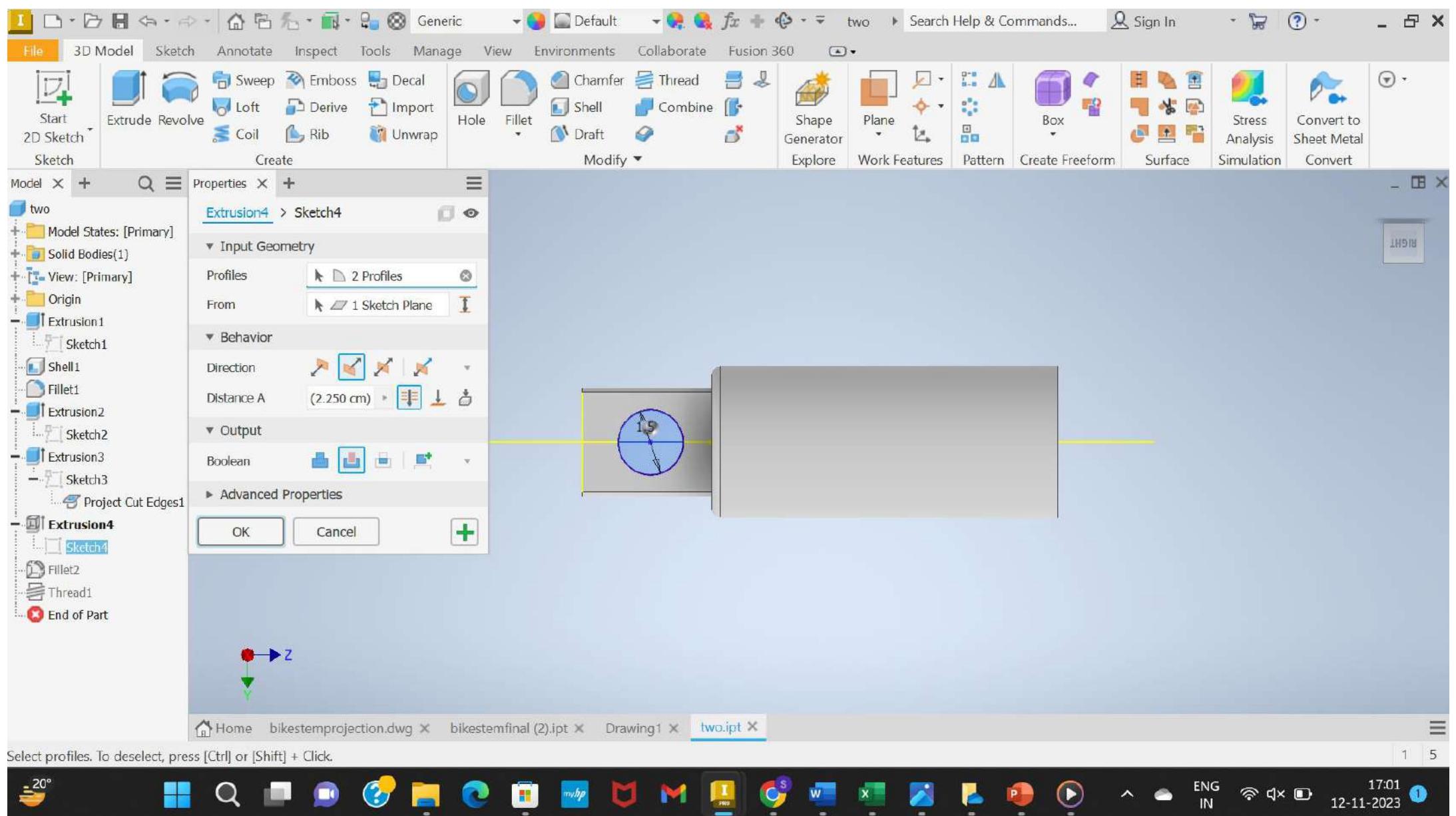


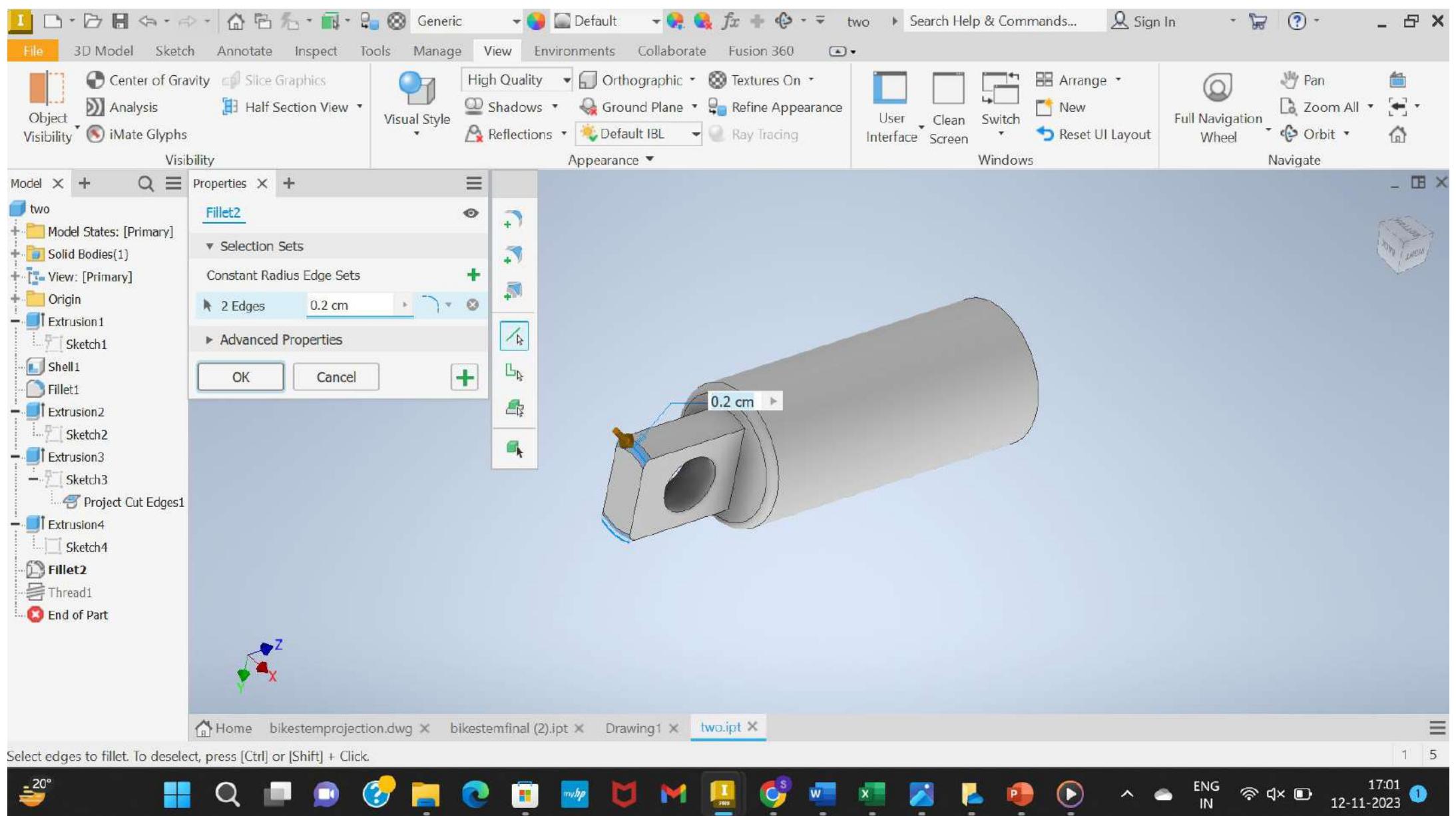


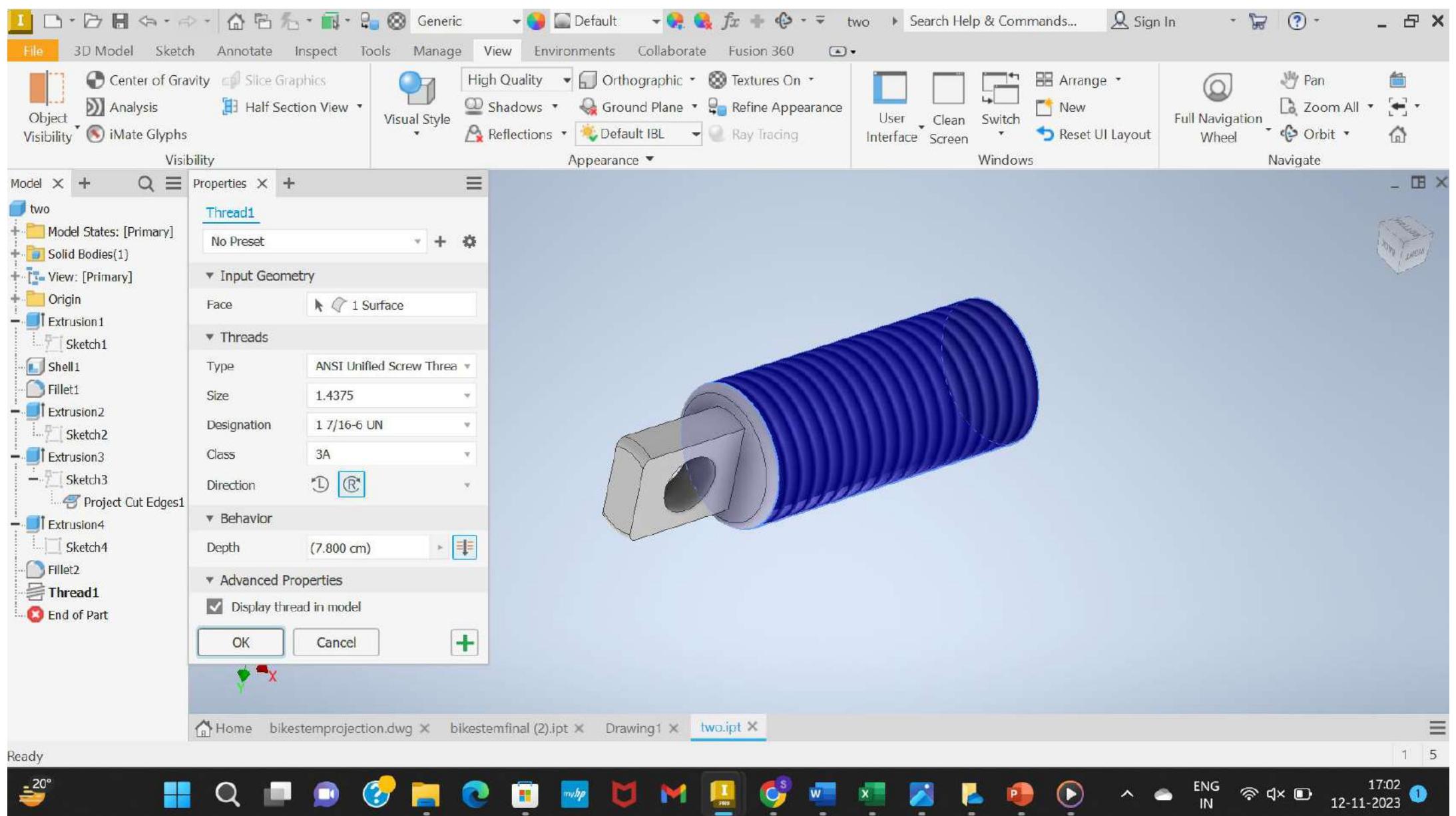
Screenshot of Fusion 360 interface showing a 3D model of a bicycle stem being extruded.

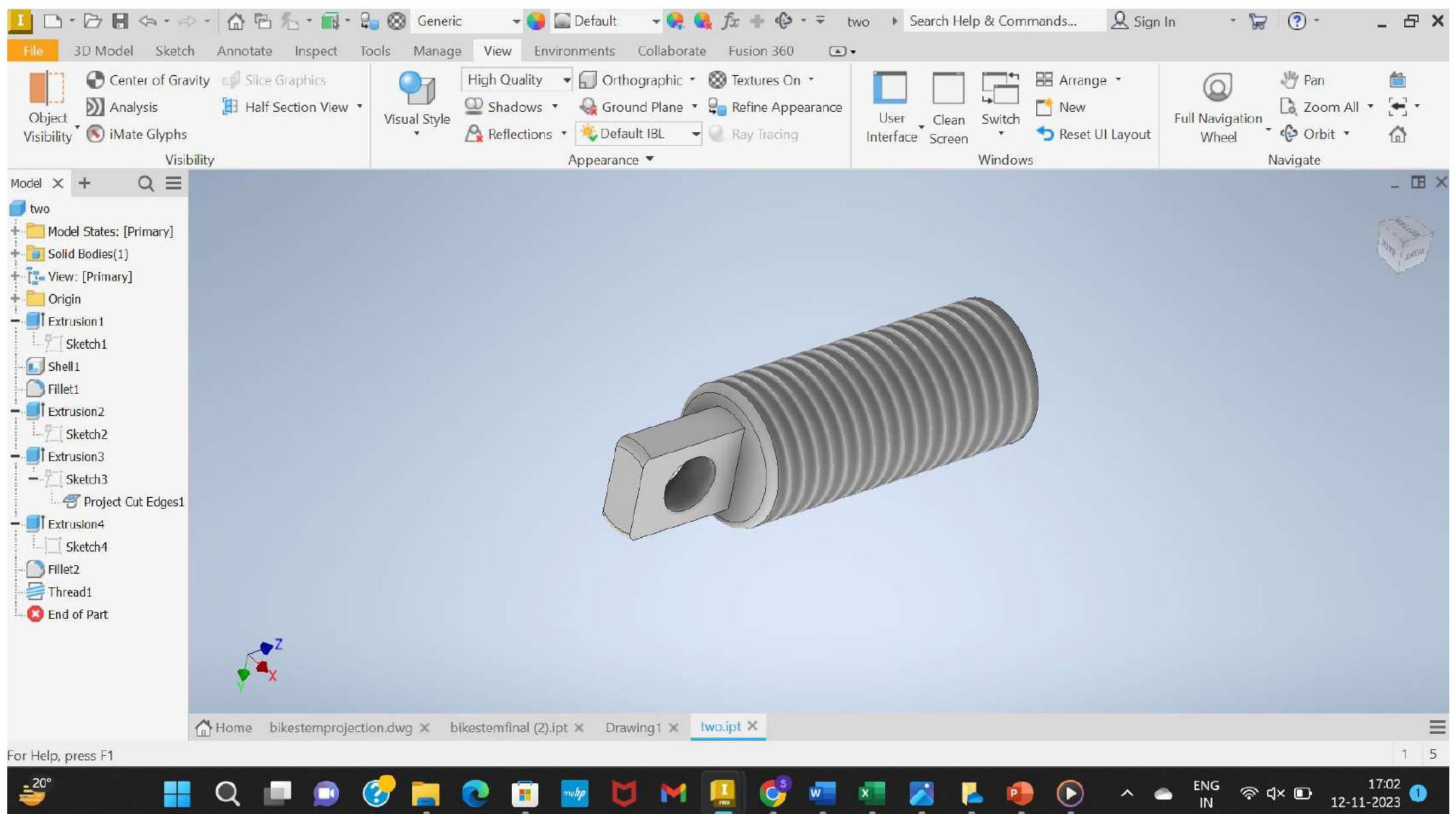
The interface includes:

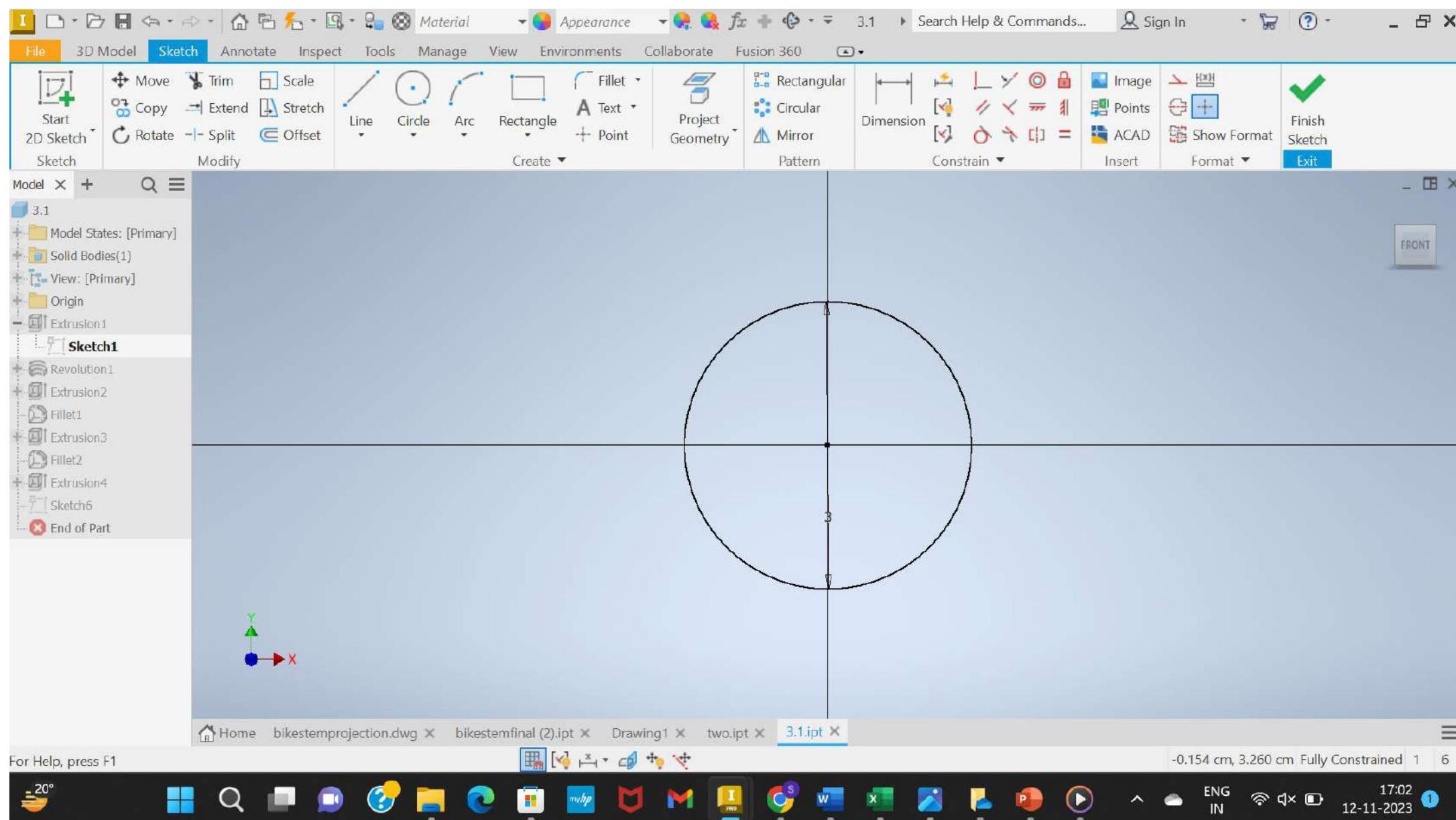
- Top Bar:** File, 3D Model, Sketch, Annotate, Inspect, Tools, Manage, View, Environments, Collaborate, Fusion 360, Search Help & Commands..., Sign In, and various icons for navigation and settings.
- Left Panel (Model Tree):** Shows the model structure: two, Model States: [Primary], Solid Bodies(1), View: [Primary], Origin, Extrusion1, Sketch1, Shell1, Fillet1, Extrusion2, Sketch2, Extrusion3, Sketch3, Project Cut Edges1, Extrusion4, Fillet2, Thread1, and End of Part.
- Properties Panel:** Displays the parameters for the current operation (Extrusion3).
 - Input Geometry:** Profiles (2 Profiles), From (1 Sketch Plane).
 - Behavior:** Direction (Up, Down, Up/Down), Distance A (3.000 cm), To (1 Face).
 - Output:** Boolean (Union, Subtract, Intersect, Create New Feature).
 - Advanced Properties:** Options for preview, preview mode, and preview settings.
- Center Viewport:** Shows the 3D model of the bicycle stem with a cross-sectional view highlighting the internal features.
- Bottom Taskbar:** Includes icons for Home, bikestemprojection.dwg, bikestemfinal (2).ipt, Drawing1, two.ipt, and various system icons like battery, signal, and date/time.











SolidWorks interface showing the creation of a 3D model from a sketch.

The ribbon menu is visible at the top, showing tabs like File, 3D Model, Sketch, Annotate, Inspect, Tools, Manage, View, Environments, Collaborate, and Fusion 360.

The toolbar below the ribbon contains icons for various tools such as Start, Extrude, Revolve, Sweep, Emboss, Decal, Loft, Derive, Import, Hole, Fillet, Chamfer, Thread, Shell, Combine, Draft, Shape Generator, Plane, Pattern, Box, Surface, Stress Analysis, and Convert.

The left sidebar displays the model tree under "Model 3.1". Key items include "Extrusion1 > Sketch1", "Revolution1", "Extrusion2", "Fillet1", "Extrusion3", "Fillet2", "Extrusion4", "Sketch6", and "End of Part".

The main workspace shows a sketch of a rectangle with a vertical dimension of "1 cm" indicated by a blue arrow. A green arrow points upwards from the top center of the rectangle, indicating the extrusion direction.

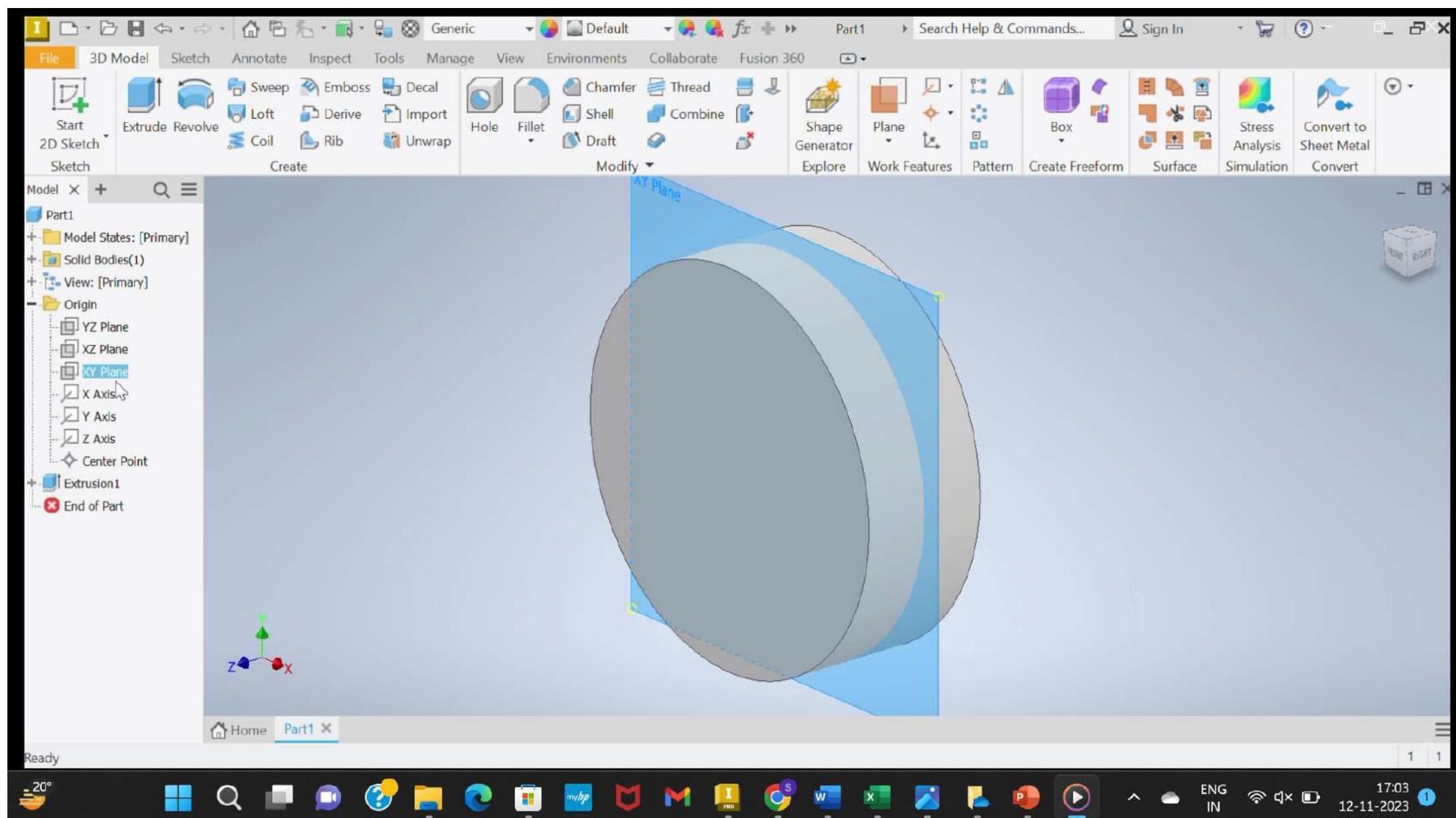
The "Properties" dialog box is open, showing the following settings for the current feature:

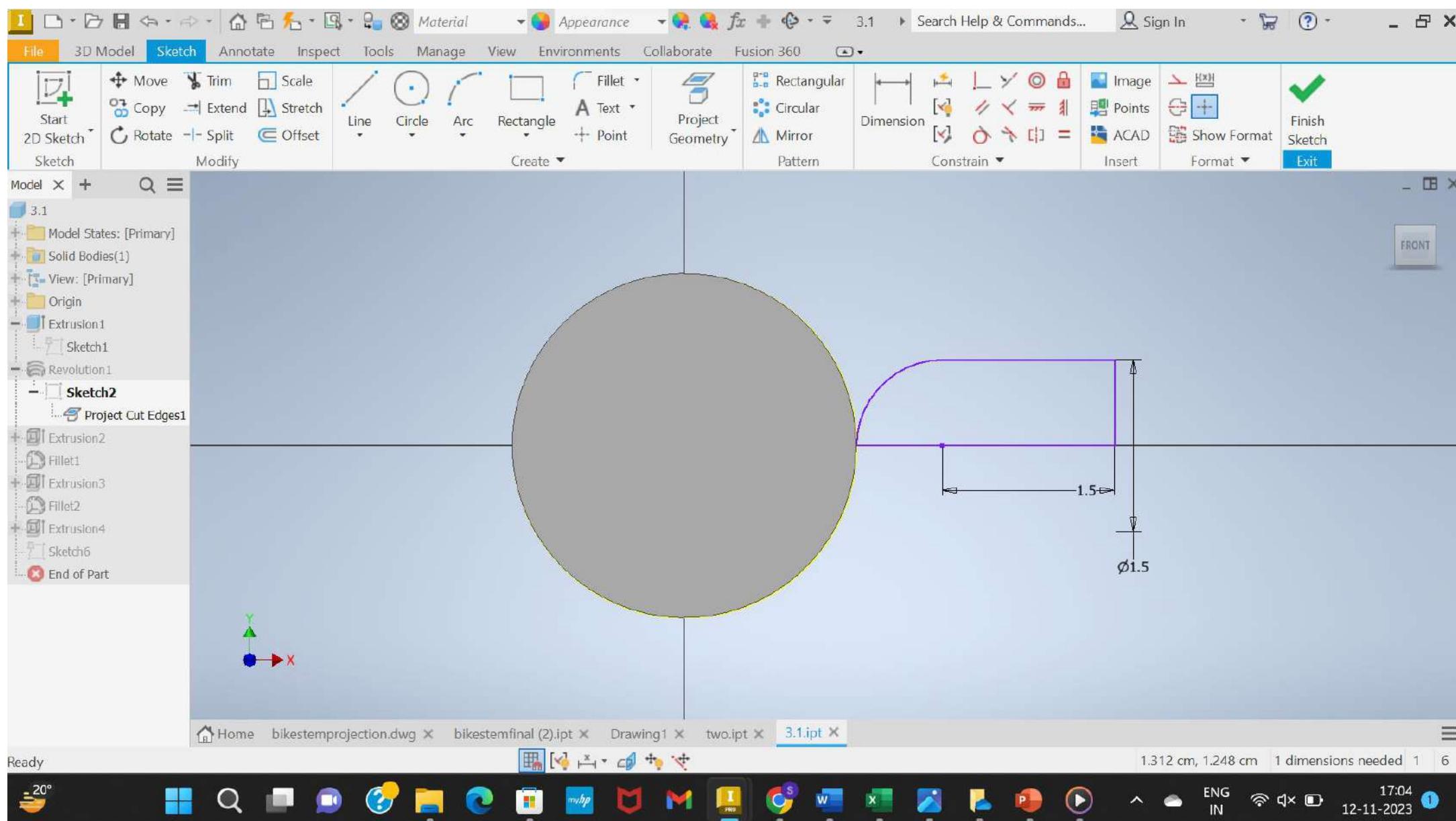
- Input Geometry:** 1 Profile, 1 Sketch Plane.
- Behavior:** Direction is set to "Up" (indicated by a green arrow), Distance A is 1 cm.
- Output:** Body Name is Solid1.

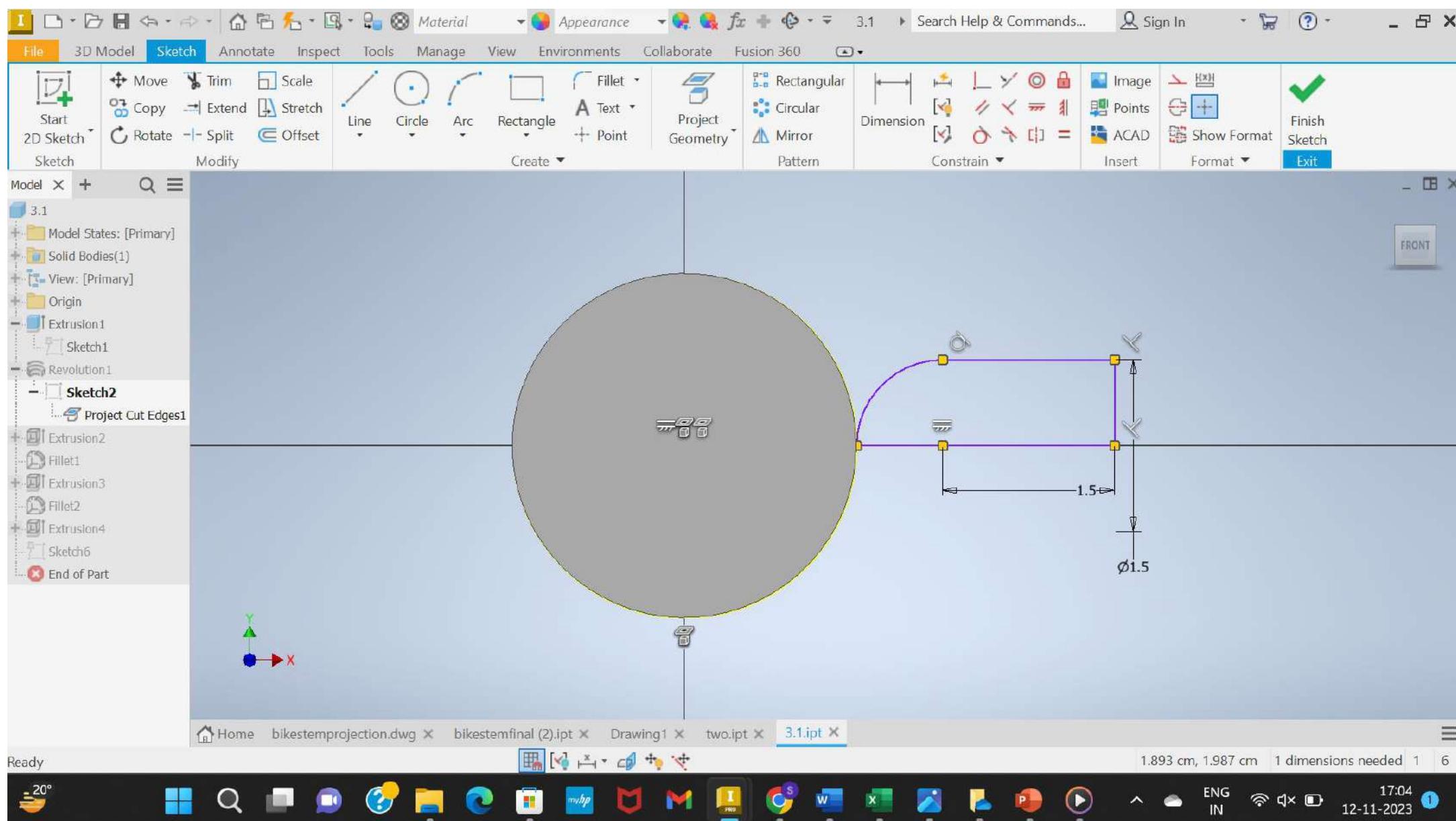
Buttons in the Properties dialog are OK, Cancel, and a green plus sign.

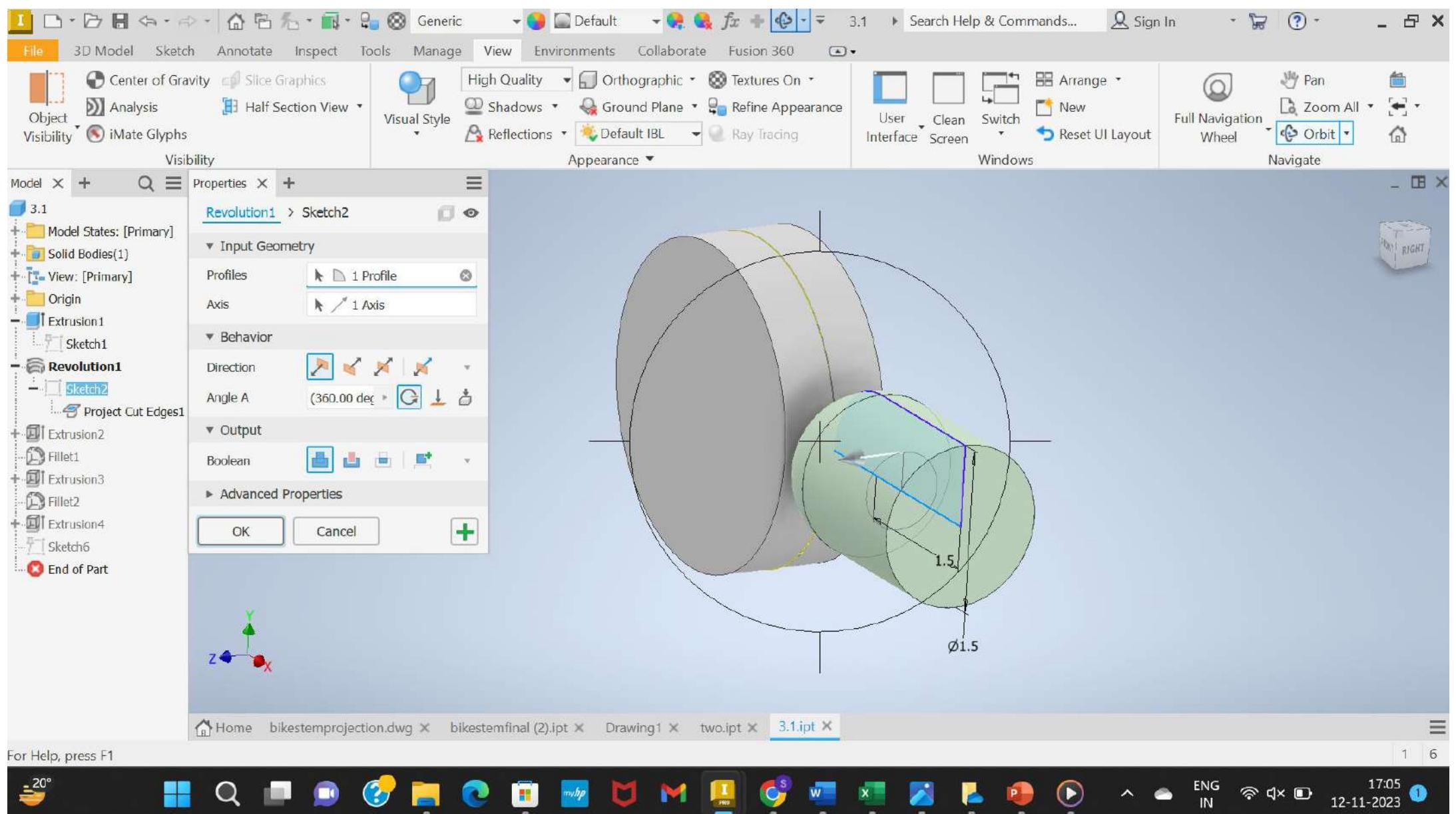
The bottom taskbar shows the file names: Home, bikestemprojection.dwg, bikestemfinal (2).ipt, Drawing1, two.ipt, and 3.1.ipt.

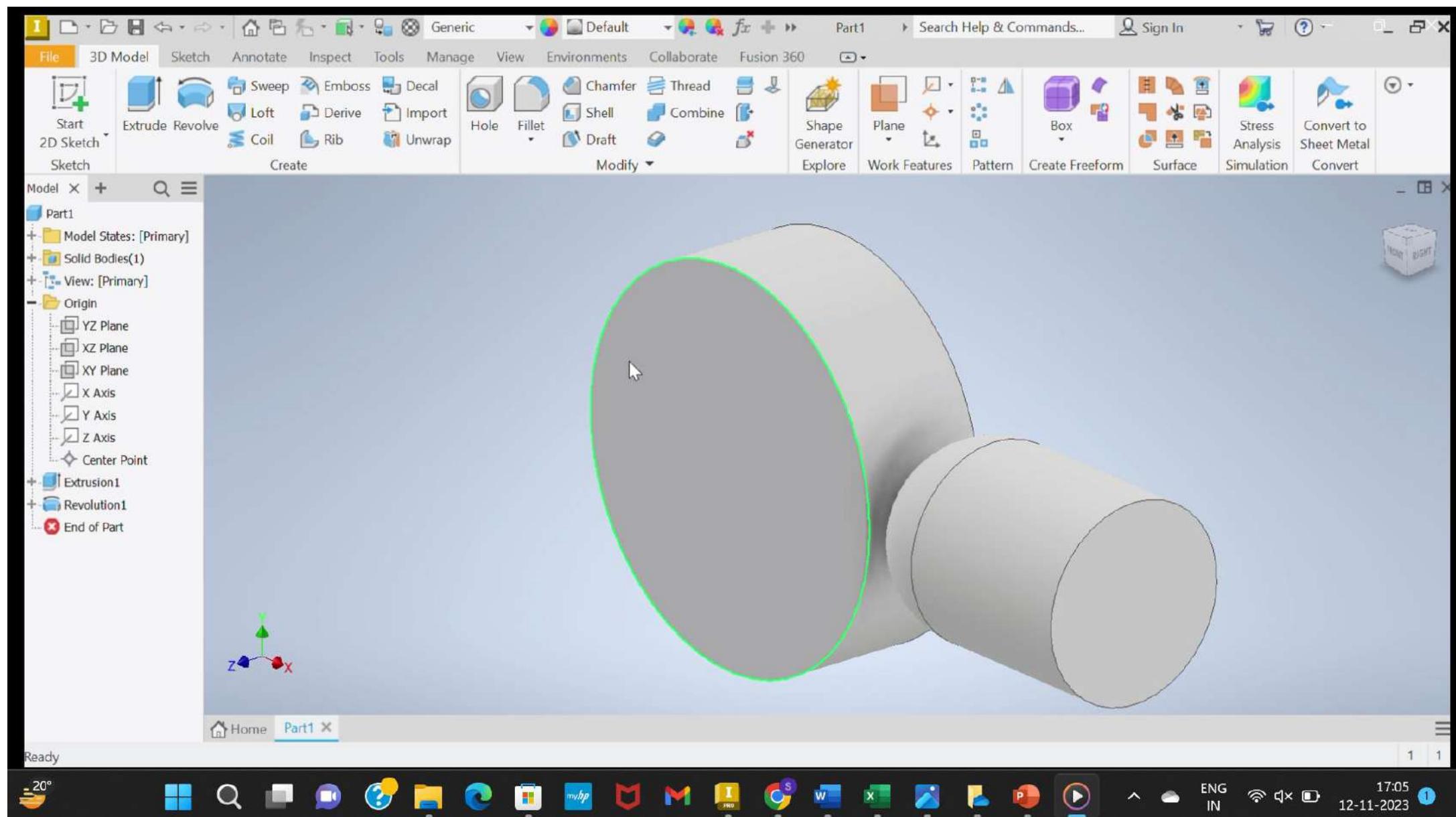
The system tray at the bottom right includes icons for temperature (20°), search, messaging, file explorer, browser, and other system functions, along with the date and time (12-11-2023) and battery status.

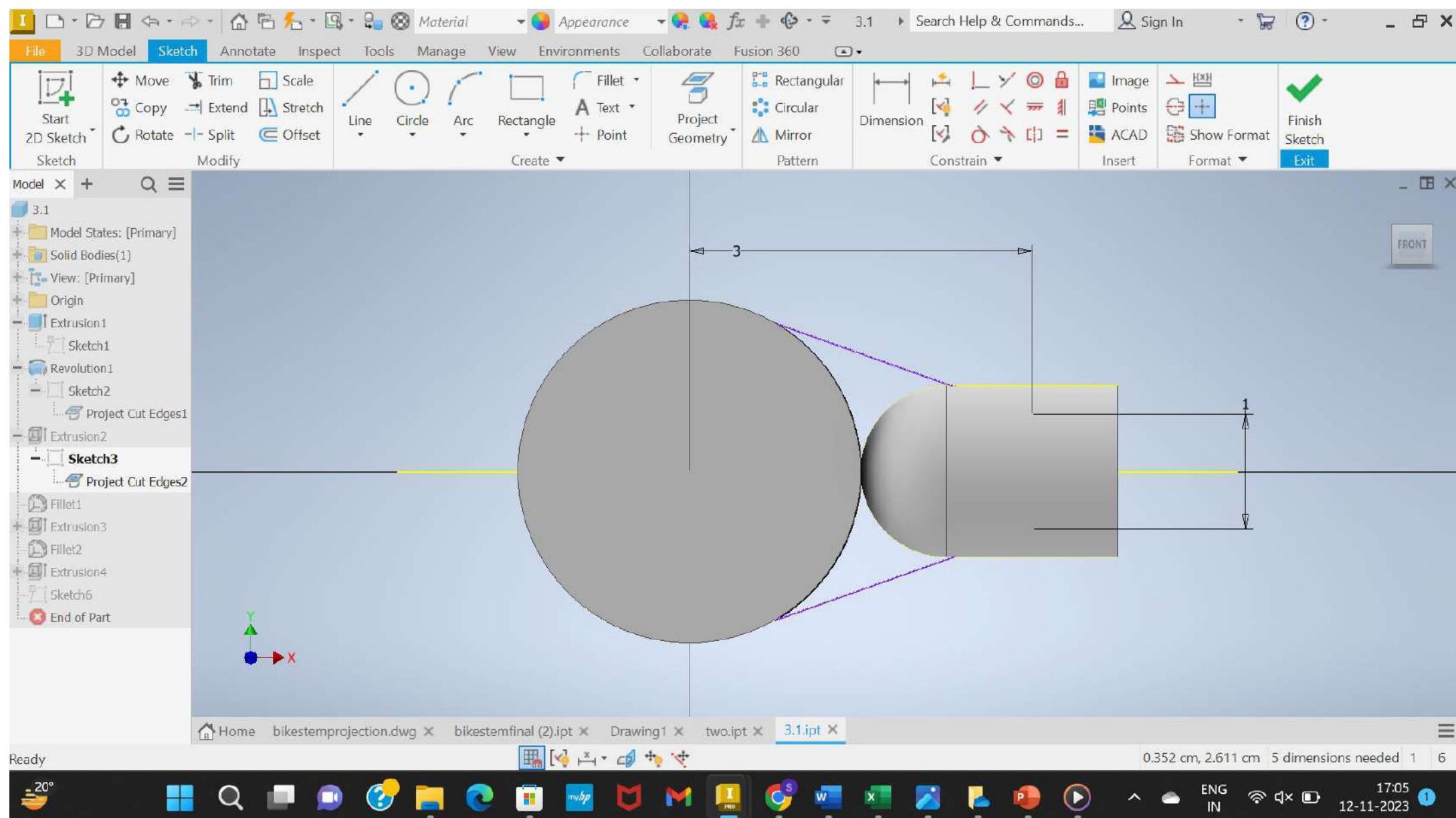


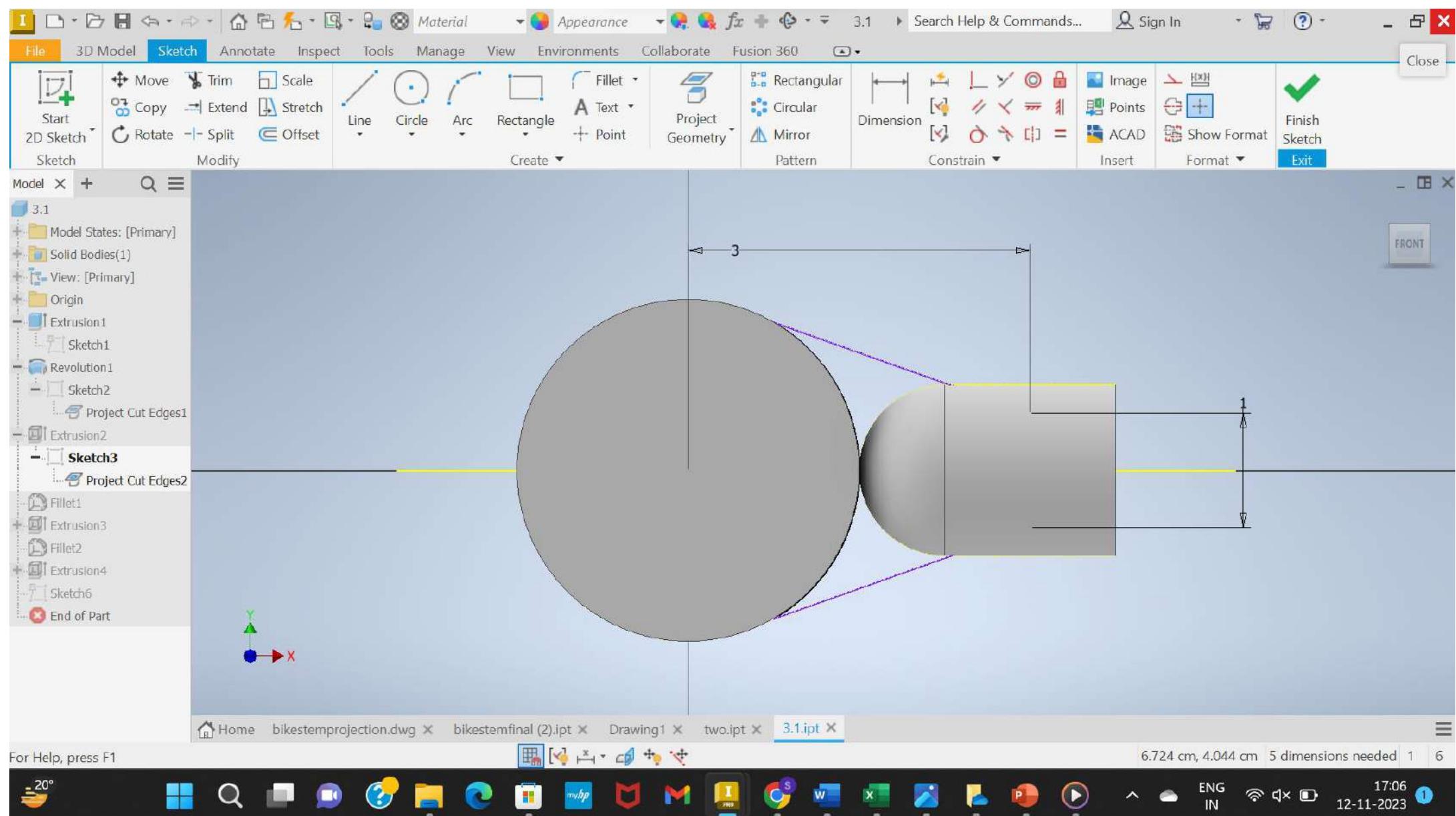


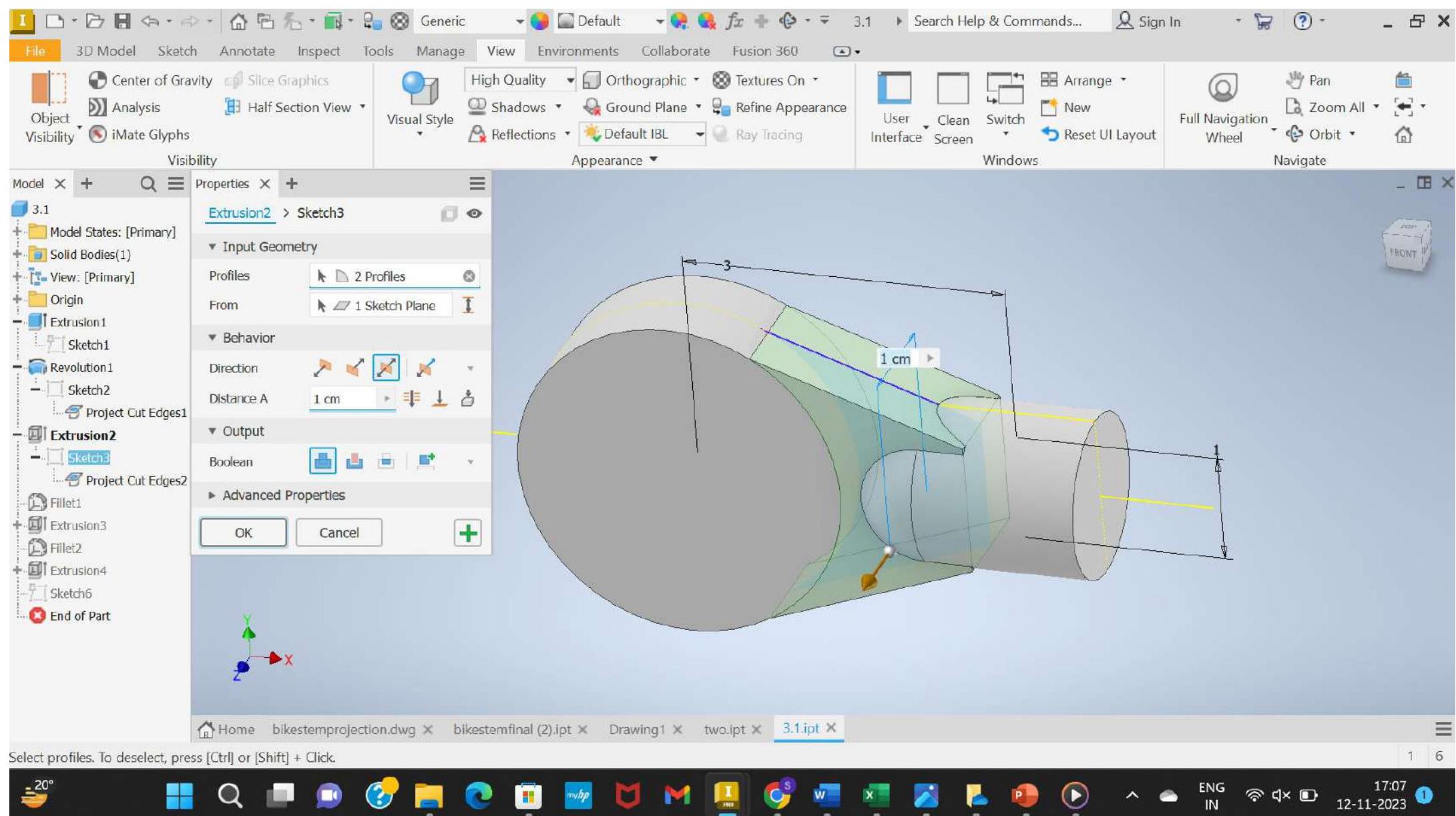


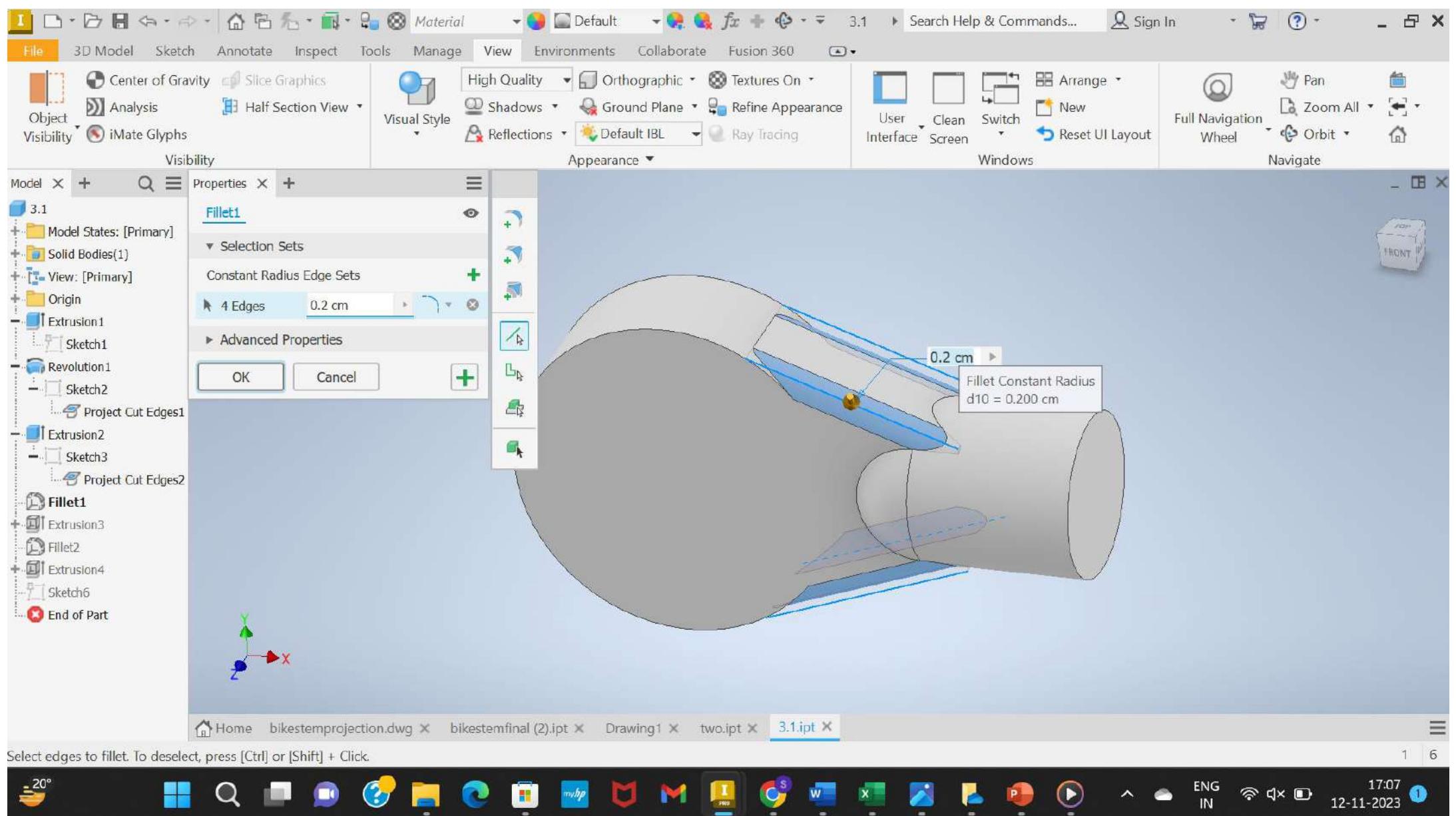


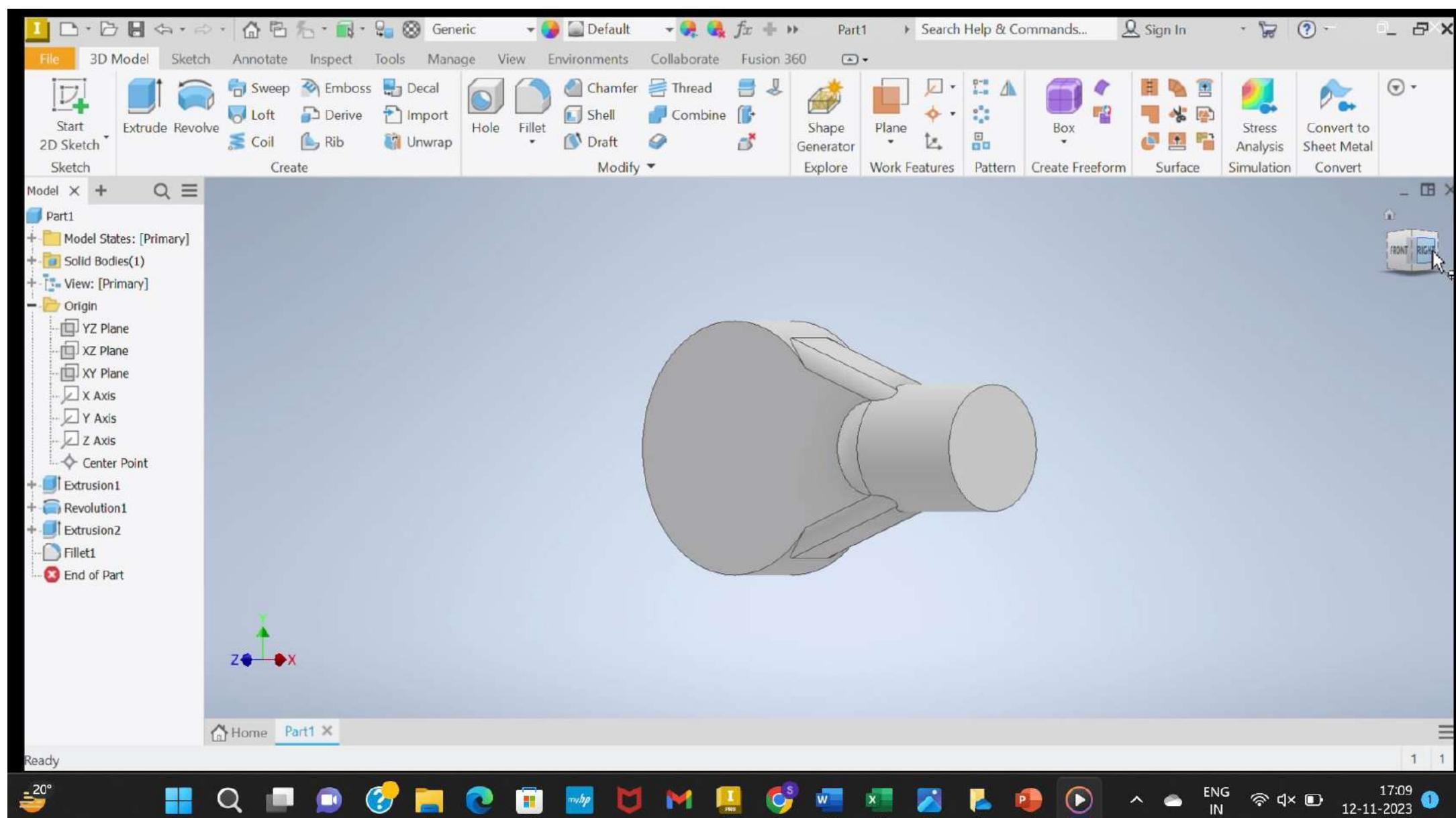


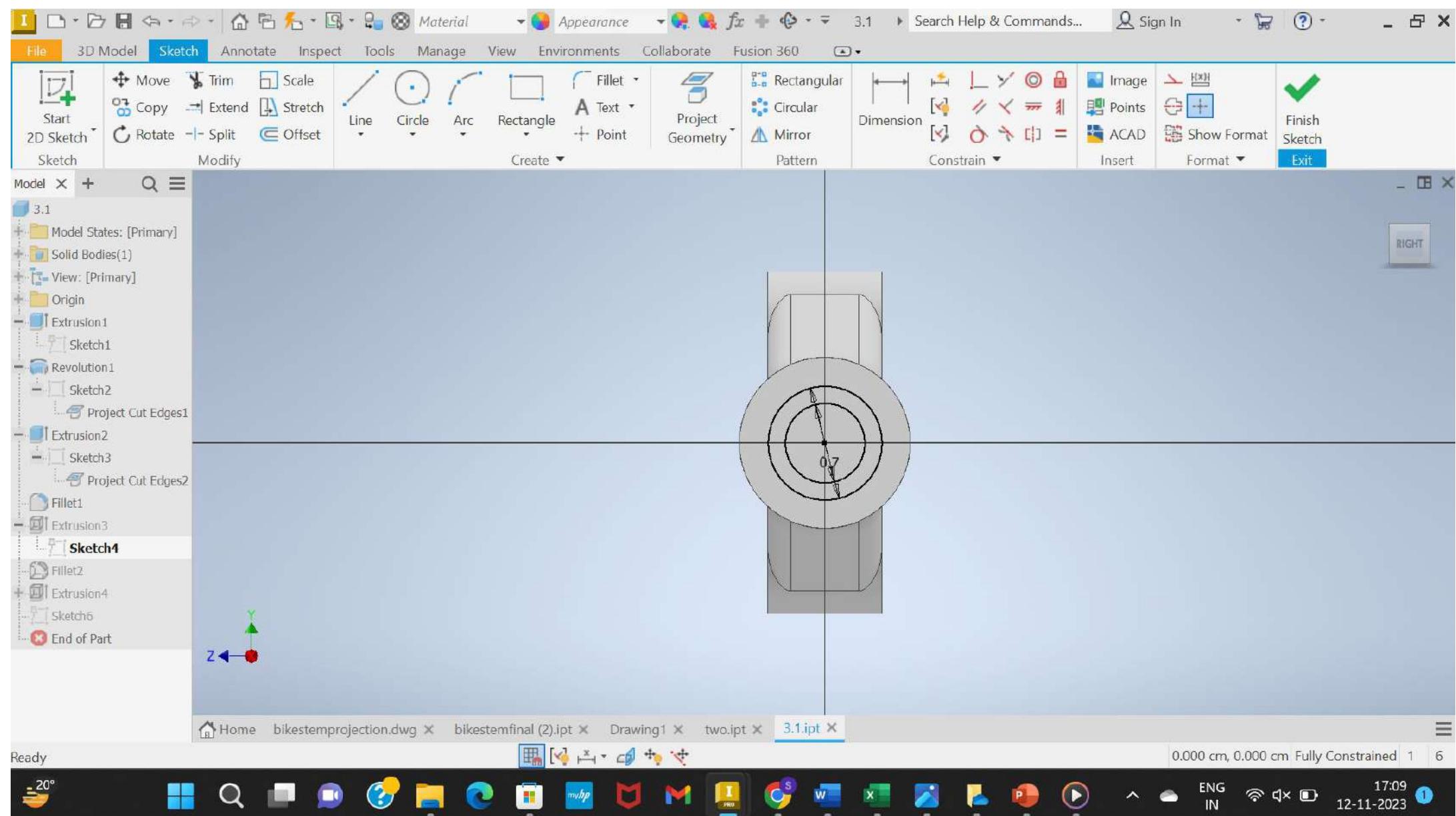












SolidWorks interface showing the creation of a 3D model of a bicycle stem projection.

The ribbon menu is open with the following tabs: File, 3D Model, Sketch, Annotate, Inspect, Tools, Manage, View, Environments, Collaborate, Fusion 360. The 3D Model tab is selected.

The toolbar below the ribbon includes: Start, Extrude, Revolve, Sweep, Emboss, Decal, Loft, Derive, Import, Hole, Chamfer, Thread, Shell, Combine, Fillet, Draft, Shape Generator, Plane, Box, Pattern, Create Freeform, Surface, Stress Analysis, Simulation, Convert.

The left pane shows the model tree:

- 3.1
- + Model States: [Primary]
- + Solid Bodies(1)
- + View: [Primary]
- + Origin
- Extrusion1
 - Sketch1
- Revolution1
 - Sketch2
- Project Cut Edges1
- Extrusion2
 - Sketch3
- Project Cut Edges2
- Fillet1
- Extrusion3
 - Sketch4
- Fillet2
- Extrusion4
 - Sketch6
- End of Part

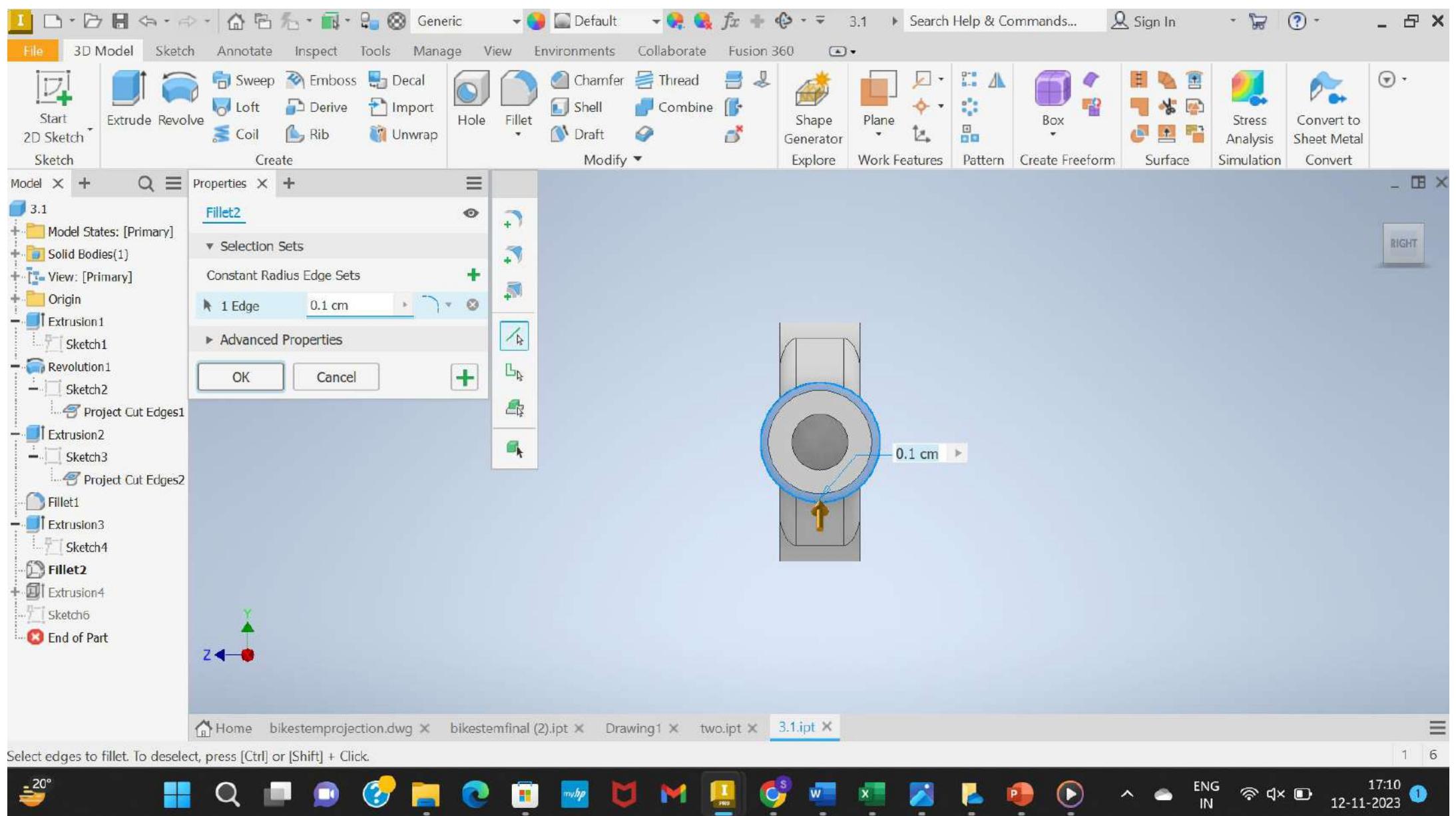
The Properties panel is open for "Extrusion3 > Sketch4". It displays the following settings:

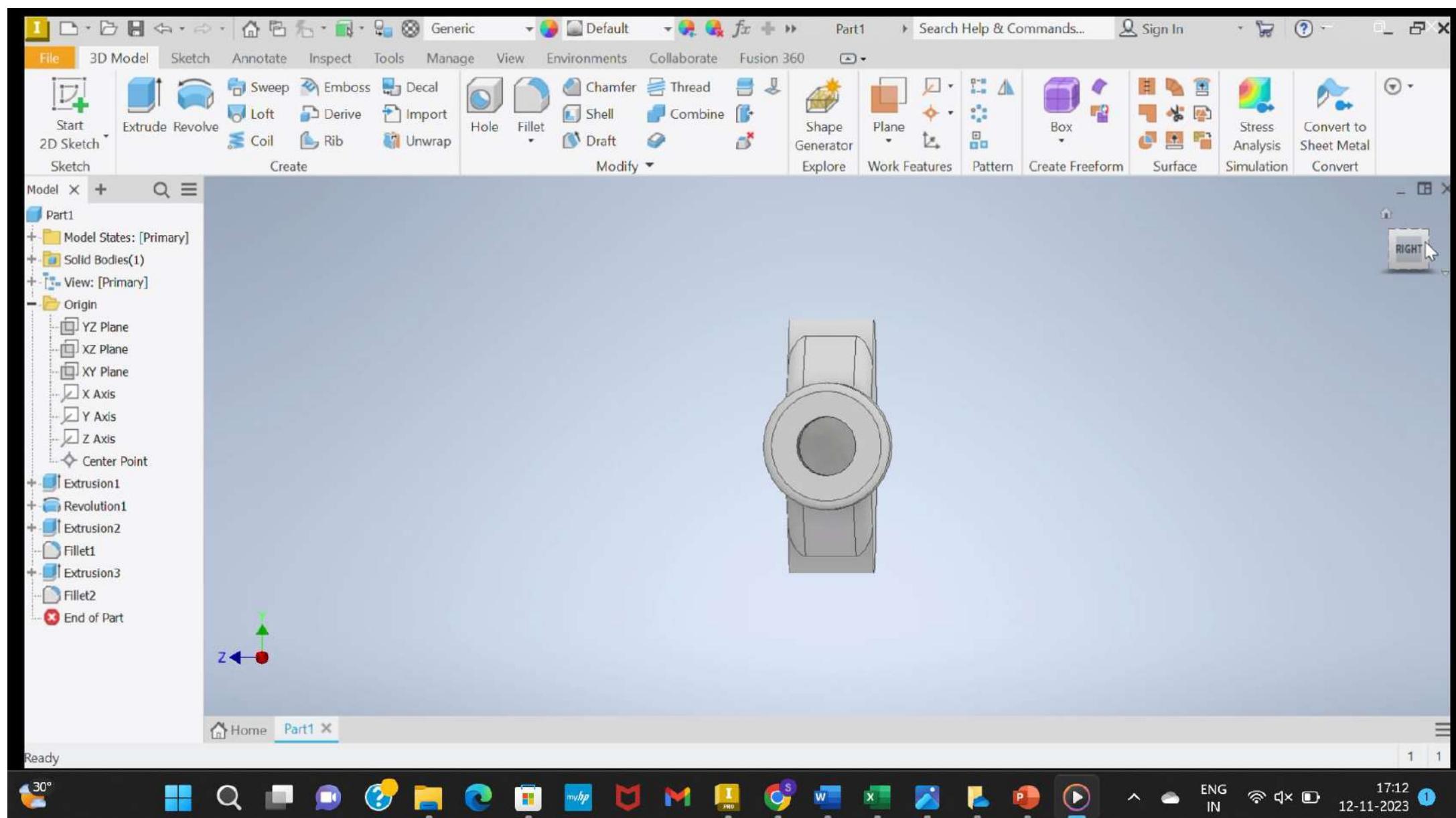
- Input Geometry:
 - Profiles: 1 Profile
 - From: 1 Sketch Plane
- Behavior:
 - Direction: Up (selected)
 - Distance A: 1.5 cm
- Output:
 - Boolean: None
- Advanced Properties

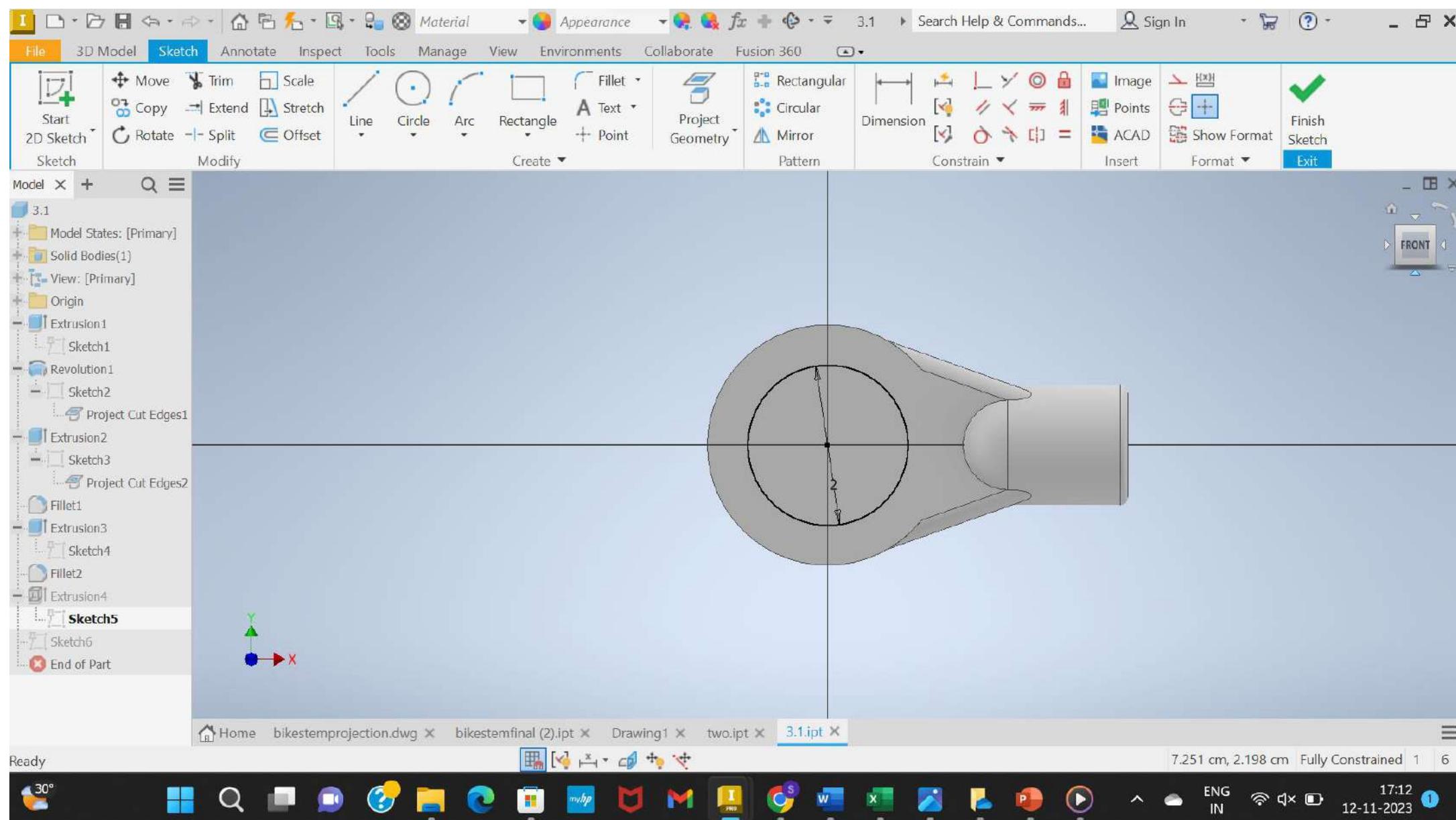
The preview window shows a 3D view of the bicycle stem projection. A sketch plane is highlighted in pink, and a dimension of 1.5 cm is shown between the top edge of the sketch and the bottom edge of the stem. A small orange arrow indicates the direction of extrusion.

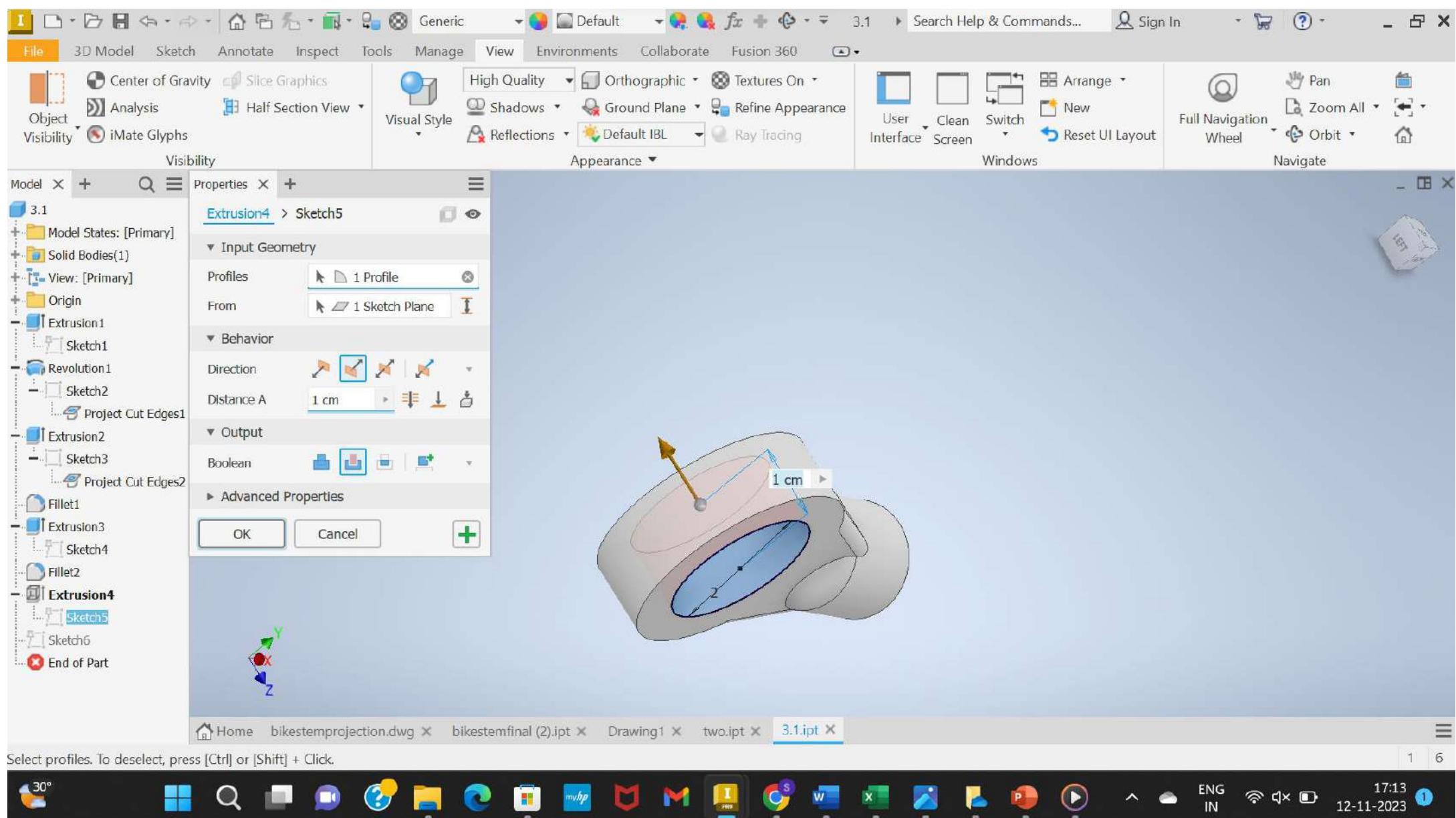
The bottom taskbar shows the following icons: Home, bikestemprojection.dwg, bikestemfinal (2).ipt, Drawing1, two.ipt, 3.1.ipt. The 3.1.ipt icon is highlighted.

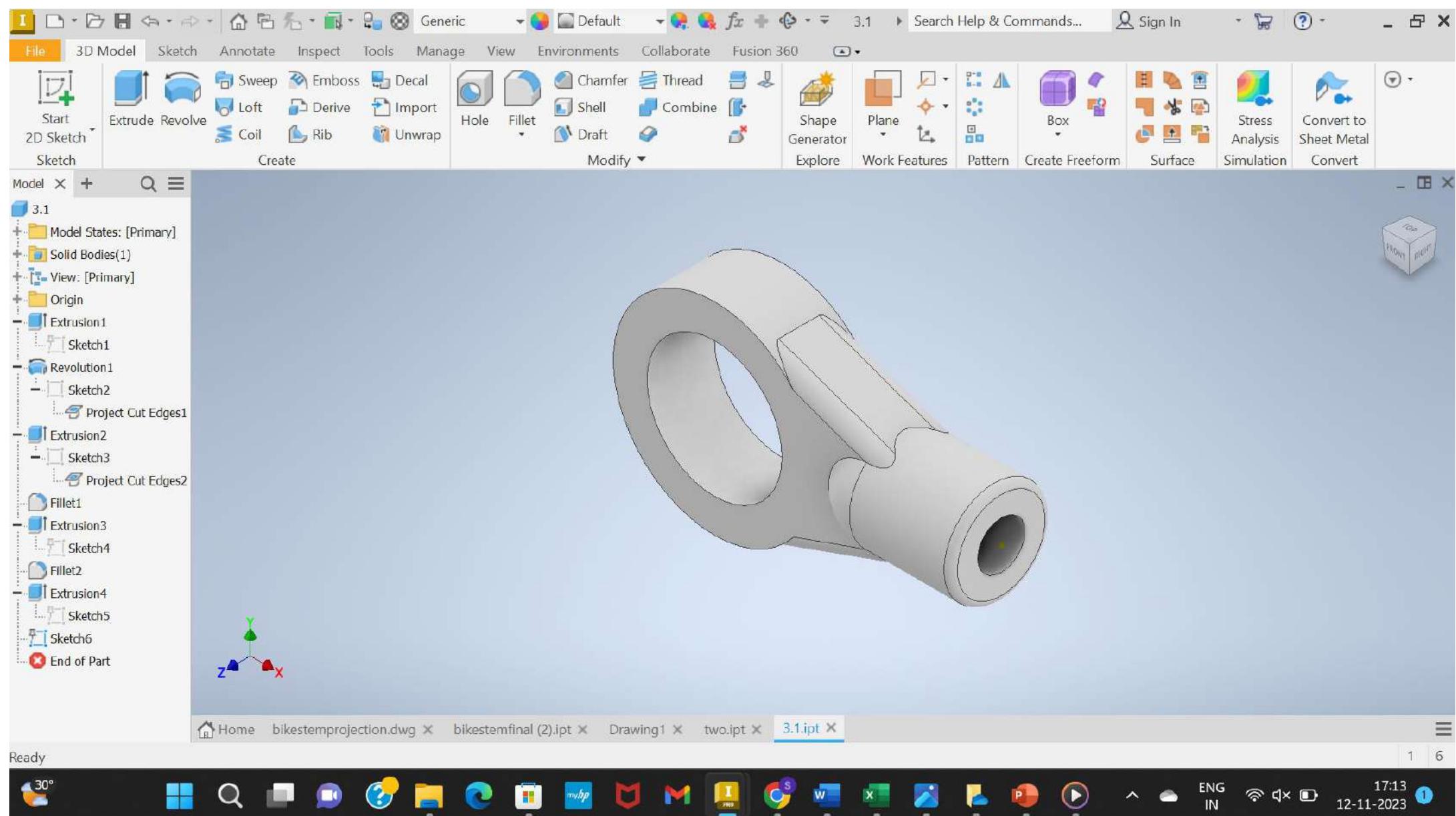
The system tray at the bottom right shows: 20°, ENG IN, 17:09, 12-11-2023, 1.

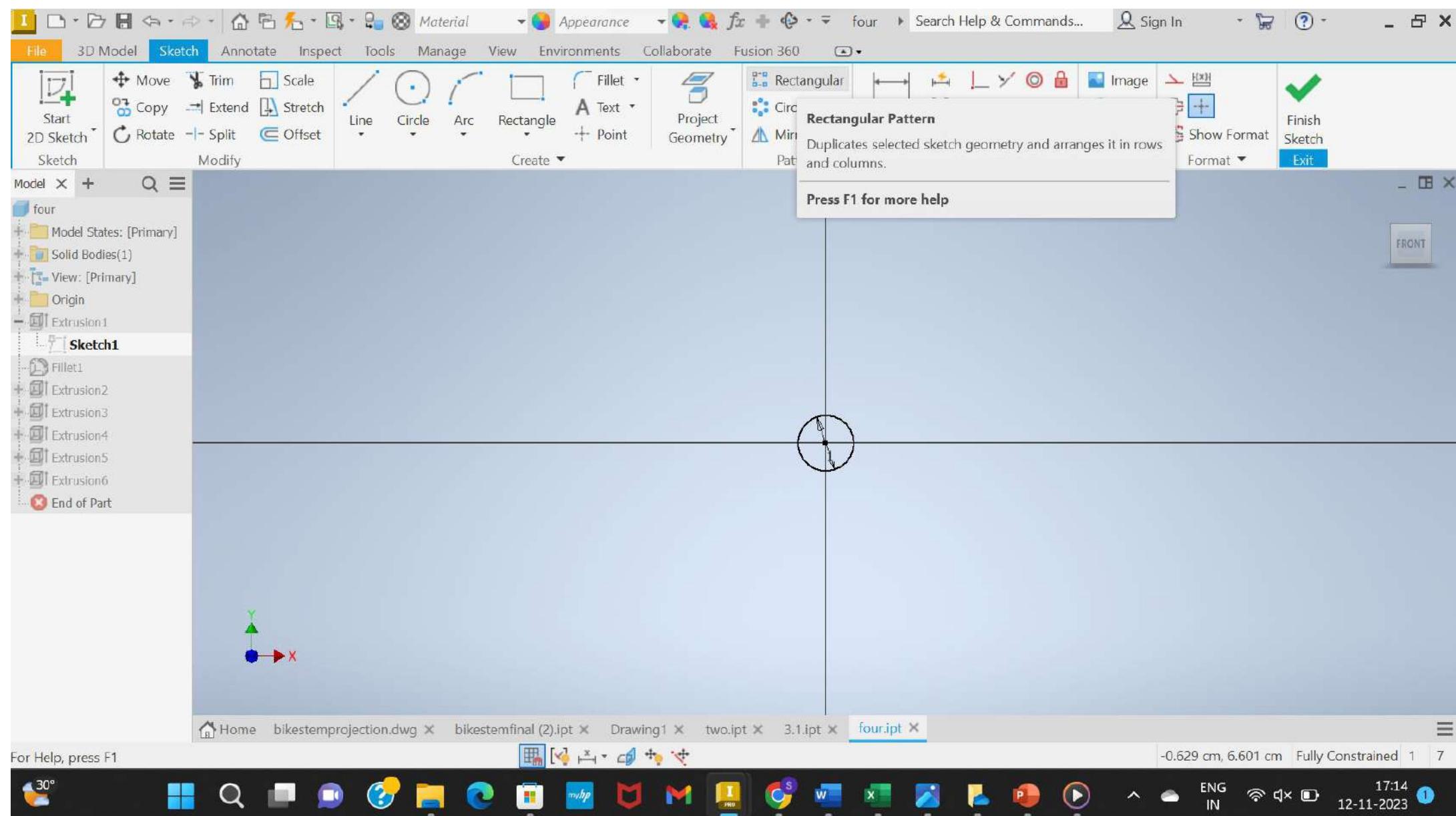












SolidWorks interface showing the creation of a 3D model named "four".

The ribbon menu is visible at the top, showing tabs like File, 3D Model, Sketch, Annotate, Inspect, Tools, Manage, View, Environments, Collaborate, and Fusion 360.

The toolbar below the ribbon contains icons for various tools such as Start, Extrude, Revolve, Sweep, Emboss, Decal, Loft, Derive, Import, Hole, Fillet, Chamfer, Thread, Shell, Combine, Draft, Shape Generator, Plane, Pattern, Box, Surface, Stress Analysis, and Convert.

The left sidebar displays the model tree under the "Model" tab, listing components like "four", "Extrusion1", "Sketch1", "Fillet1", and several other extrusions and features.

The main workspace shows a sketch of a rectangle with a dimension of 1. A vertical dimension of 0.5 cm is being applied to the bottom edge of the rectangle. A coordinate system (X, Y, Z) is shown at the bottom left.

A properties manager dialog box is open, titled "Extrusion1 > Sketch1". It shows the following settings:

- Input Geometry:** 1 Profile, 1 Sketch Plane.
- Behavior:** Direction is set to "Up" (indicated by an upward arrow icon). Distance A is set to 0.5 cm.
- Output:** Body Name is set to Solid1.

Buttons for OK, Cancel, and a green plus sign are present at the bottom of the dialog.

The bottom taskbar shows the file names: Home, bikestemprojection.dwg, bikestemfinal (2).ipt, Drawing1, two.ipt, 3.1.ipt, and four.ipt.

The system tray at the bottom right includes icons for weather (30°), search, messaging, file explorer, browser, and productivity tools, along with system status indicators like battery level, signal strength, and date/time (12-11-2023, 17:14).

